SIEMENS

SCALANCE WLC711

User Guide, V8.11

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About This Guide

This guide describes how to install, configure, and manage the SCALANCE WLC711 system. This guide is also available as an online help system.

To Access the Online Help System:

1. In the SCALANCE IWLAN Assistant Top Menu bar, click **Help**.
2. The online help system is launched.

Intended Audience

This guide is a reference for system administrators who install and manage the SCALANCE IWLAN Controller.

Any administrator performing tasks described in this guide must have an account with administrative privileges.

How to Use This Guide

This preface provides an overview of this guide and a brief summary of each chapter, defines the conventions used in this document; and instructs how to obtain technical support from Siemens AG. To locate information about various subjects in this guide, refer to the following table.

For...	Refer to...
An overview of the product, its features and functionality.	Chapter 1, Overview of the SCALANCE WLC711 Solution
Information about how to perform the installation, first time setup and configuration of the SCALANCE IWLAN Controller, as well as configuring the data ports and defining routing.	Chapter 2, Configuring the SCALANCE IWLAN Controller
Information on how to install the Wireless AP, how it discovers and registers with the SCALANCE IWLAN Controller, and how to view and modify radio configuration.	Chapter 3, Configuring the Wireless AP
An overview of topologies and provides detailed information about how to configure them.	Chapter 4, Configuring Topologies
An overview of policies and provides detailed information about how to configure them.	Chapter 5, Configuring Policies
An overview of WLAN services and provides detailed information about how to configure them.	Chapter 6, Configuring WLAN Services
An overview of Virtual Network Services (VNS), provides detailed instructions in how to configure a VNS, either using the Wizards or by manually creating the component parts of a VNS.	Chapter 7, Configuring a VNS

For...	Refer to...
Information about configuring Classes of Service (CoS) which are a configuration entity containing QoS Marking (802.1p and ToS/DSCP), Inbound/Outbound Rate Limiting and Transmit Queue Assignments.	Chapter 8, Configuring Classes of Service
Information about configuring Sites which is a mechanism for grouping APs and refers to specific Policies, Classes of Service (CoS) and RADIUS servers that are grouped to form a single configuration.	Chapter 9, Configuring Sites
An overview of Mesh networks and provides detailed information about how to create a Mesh network.	Chapter 10, Working with a Mesh Network
An overview of a Wireless Distribution System (WDS) network configuration and provides detailed information about how to create a Mesh network.	Chapter 11, Working with a Wireless Distribution System
Information on how to set up the features that maintain service availability in the event of a SCALANCE IWLAN Controller failover.	Chapter 12, Availability and Session Availability
Information on how to set up the mobility domain that provides mobility for a wireless device user when the user roams from one Wireless AP to another in the mobility domain.	Chapter 13, Configuring Mobility
Information on how to use the SCALANCE WLC711 features with third-party wireless access points.	Chapter 14, Working with Third-party APs
Information on the security tool that scans for, detects, and reports on rogue APs.	Chapter 15, Working with the Mitigator
Information on the various reports and displays available in the SCALANCE WLC711 system.	Chapter 16, Working with Reports and Statistics
Information on system administration activities, such as performing Wireless AP client management, defining management users, configuring the network time, and configuring Web session timeouts.	Chapter 17, Performing System Administration
Information on how to view and interpret the logs, traces, audits and DHCP messages.	Chapter 18, Logs, Traces, Audits and DHCP Messages
Information on how to configure GuestPortal accounts using the SCALANCE WLC711.	Chapter 19, Working with GuestPortal Administration
A list of terms and definitions for the SCALANCE IWLAN Controller and the Wireless AP as well as standard industry terms used in this guide.	Appendix A, Glossary
The default GuestPortal ticket page source code.	Appendix B, Default GuestPortal Source Code

Formatting Conventions

The SCALANCE WLC711 documentation uses the following formatting conventions to make it easier to find information and follow procedures:

- **Bold** text is used to identify components of the management interface, such as menu items and section of pages, as well as the names of buttons and text boxes.

For example: Click **Logout**.

- `Monospace` font is used in code examples and to indicate text that you type.

  For example: Type `https://<wlc-address>[:mgmt-port]`

Additional Documentation

SCALANCE IWLAN Controller documentation is available at:

www.siemens.com/automation/service&support

1

Overview of the SCALANCE WLC711 Solution

This chapter describes SCALANCE WLC711 concepts, including:

For information about...	Refer to page...
Introduction	1-1
Conventional Wireless LANs	1-2
Elements of the SCALANCE WLC711 Solution	1-3
SCALANCE WLC711 and Your Network	1-5

Introduction

The next generation of Siemens wireless networking devices provides a truly scalable WLAN solution. SCALANCE IWLAN Controller Access Points (Wireless APs) are fit access points controlled through a sophisticated network device, the SCALANCE IWLAN Controller. This solution provides the security and manageability required for huge industrial wireless networks.

The SCALANCE IWLAN Controller provides a secure, highly scalable, cost-effective solution based on the IEEE 802.11 standard.

This chapter provides an overview of the fundamental principles of the SCALANCE IWLAN Controller.

The SCALANCE IWLAN Controller

The SCALANCE IWLAN Controller is a network device designed to integrate with an existing wired Local Area Network (LAN). The SCALANCE IWLAN Controller provides centralized management, network access, and routing to wireless devices that use Wireless APs to access the network. It can also be configured to handle data traffic from third-party access points.

The SCALANCE IWLAN Controller provides the following functionality:

- Controls and configures Wireless APs, providing centralized management
- Authenticates wireless devices that contact a Wireless AP
- Assigns each wireless device to a VNS when it connects
- Routes traffic from wireless devices, using VNS, to the wired network
- Applies filtering policies to the wireless device session
- Provides session logging and accounting capability

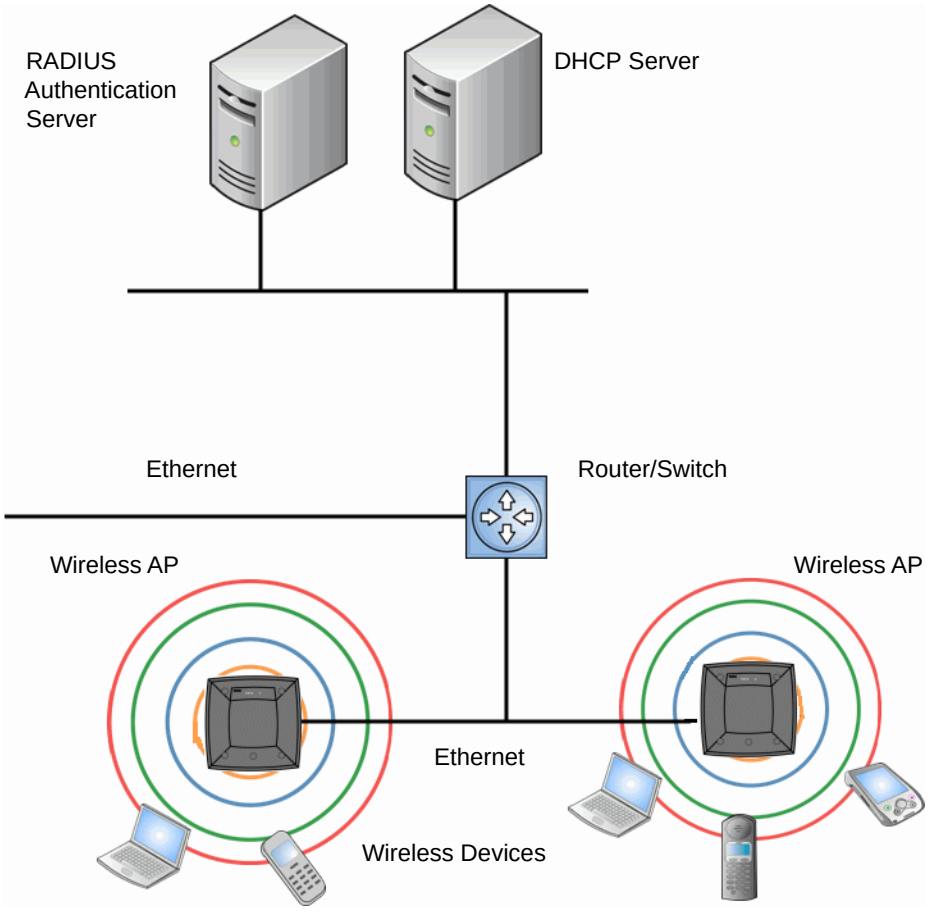
Conventional Wireless LANs

Wireless communication between multiple computers requires that each computer be equipped with a receiver/transmitter—a WLAN Network Interface Card (NIC)—capable of exchanging digital information over a common radio frequency. This is called an ad hoc network configuration. An ad hoc network configuration allows wireless devices to communicate together. This setup is defined as an independent basic service set (IBSS).

An alternative to the ad hoc configuration is the use of an access point. This may be a dedicated hardware bridge or a computer running special software. Computers and other wireless devices communicate with each other through this access point. The 802.11 standard defines access point communications as devices that allow wireless devices to communicate with a distribution system. This setup is defined as a basic service set (BSS) or infrastructure network.

To allow the wireless devices to communicate with computers on a wired network, the access points must be connected to the wired network providing access to the networked computers. This topology is called bridging. With bridging, security and management scalability is often a concern.

Figure 1-1 Standard Wireless Network Solution Example



The wireless devices and the wired networks communicate with each other using standard networking protocols and addressing schemes. Most commonly, Internet Protocol (IP) addressing is used.

Elements of the SCALANCE WLC711 Solution

The SCALANCE WLC711 solution consists of two devices:

- SCALANCE IWLAN Controller
- IWLAN Controller Access Points (Wireless APs)

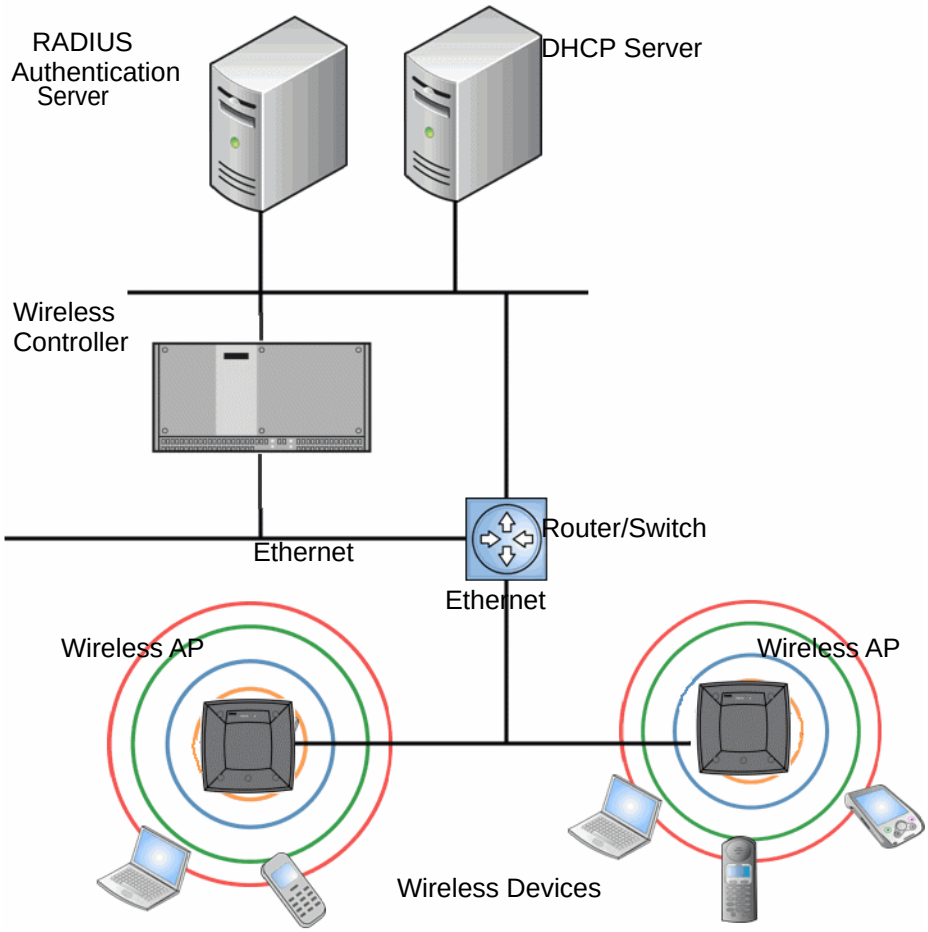
This architecture allows a single SCALANCE IWLAN Controller to control many Wireless APs, making the administration and management of large networks much easier.

There can be several SCALANCE IWLAN Controllers in the network, each with a set of registered Wireless APs. The SCALANCE IWLAN Controllers can also act as backups to each other, providing stable network availability.

In addition to the SCALANCE IWLAN Controllers and Wireless APs, the solution requires three other components, all of which are standard for enterprise and service provider networks:

- **RADIUS Server** (Remote Access Dial-In User Service) or other authentication server
- **DHCP Server** (Dynamic Host Configuration Protocol). If you do not have a DHCP Server on your network, you can enable the local DHCP Server on the SCALANCE IWLAN Controller. The local DHCP Server is useful as a general purpose DHCP Server for small subnets. For more information, see Step 11 of "Setting Up the Data Ports" on page 2-14.
- **SLP** (Service Location Protocol)

Figure 1-2 SCALANCE IWLAN Controller Solution



As illustrated in Figure 1-2, the SCALANCE IWLAN Controller appears to the existing network as if it were an access point, but in fact one SCALANCE IWLAN Controller controls many Wireless APs. The SCALANCE IWLAN Controller has built-in capabilities to recognize and manage the Wireless APs. The SCALANCE IWLAN Controller:

- Activates the Wireless APs
- Enables Wireless APs to receive wireless traffic from wireless devices
- Processes the data traffic from the Wireless APs
- Forwards or routes the processed data traffic out to the network
- Authenticates requests and applies access policies

Simplifying the Wireless APs makes them cost-effective, easy to manage, and easy to deploy. Putting control on an intelligent centralized SCALANCE IWLAN Controller enables:

- Centralized configuration, management, reporting, and maintenance
- High security
- Flexibility to suit enterprise
- Scalable and resilient deployments with a few SCALANCE IWLAN Controllers controlling hundreds of Wireless APs

The SCALANCE IWLAN system:

- **Scales up to Enterprise capacity —** SCALANCE IWLAN Controllers are scalable:
  - WLC711 — Up to 32 APs

  In turn, each Wireless AP can handle up to 254 wireless devices, with each radio supporting a maximum of 127. With additional SCALANCE IWLAN Controllers, the number of wireless devices the solution can support can reach into the thousands.
- **Integrates with existing network —** A SCALANCE IWLAN Controller can be added to an existing enterprise network as a new network device, greatly enhancing its capability without interfering with existing functionality. Integration of the SCALANCE IWLAN Controllers and Wireless APs does not require any re-configuration of the existing infrastructure (for example, VLANs).
- **Offers centralized management and control —** An administrator accesses the SCALANCE IWLAN Controller in its centralized location to monitor and administer the entire wireless network. From the SCALANCE IWLAN Controller the administrator can recognize, configure, and manage the Wireless APs and distribute new software releases.
- **Provides easy deployment of** Wireless AP**s —** The initial configuration of the Wireless APs on the centralized SCALANCE IWLAN Controller can be done with an automatic "discovery" technique.
- **Provides security via user authentication —** Uses existing authentication (AAA) servers to authenticate and authorize users.
- **Provides security via filters and privileges —** Uses virtual networking techniques to create separate virtual networks with defined authentication and billing services, access policies, and privileges.
- **Supports seamless mobility and roaming —** Supports seamless roaming of a wireless device from one Wireless AP to another on the same SCALANCE IWLAN Controller or on a different SCALANCE IWLAN Controller.
- **Integrates third-party access points —** Uses a combination of network routing and authentication techniques.
- **Prevents rogue devices —** Unauthorized access points are detected and identified as either harmless or dangerous rogue APs.
- **Provides accounting services —** Logs wireless user sessions, user group activity, and other activity reporting, enabling the generation of consolidated billing records.
- **Offers troubleshooting capability —** Logs system and session activity and provides reports to aid in troubleshooting analysis.
- **Offers dynamic RF management — A**utomatically selects channels and adjusts Radio Frequency (RF) signal propagation and power levels without user intervention.

SCALANCE WLC711 and Your Network

This section is a summary of the components of the SCALANCE WLC711 solution on your enterprise network. The following are described in detail in this guide, unless otherwise stated:

- SCALANCE IWLAN Controller — A network device that provides centralized control over all access points and manages the network assignment of wireless device clients associating through access points.

- **IWLAN Controller Access Point (Wireless AP)** — A wireless LAN fit access point that communicates with a SCALANCE IWLAN Controller.
- **RADIUS Server** (Remote Access Dial-In User Service) (RFC2865), or other authentication server — An authentication server that assigns and manages ID and Password protection throughout the network. Used for authentication of the wireless users in either 802.1x or Captive Portal security modes. The RADIUS Server system can be set up for certain standard attributes, such as filter ID, and for the Vendor Specific Attributes (VSAs). In addition, RADIUS Disconnect (RFC3576) which permits dynamic adjustment of user policy (user disconnect) is supported.
- **DHCP Server** (Dynamic Host Configuration Protocol) (RFC2131) — A server that assigns dynamically IP addresses, gateways, and subnet masks. IP address assignment for clients can be done by the DHCP server internal to the SCALANCE IWLAN Controller, or by existing servers using DHCP relay. It is also used by the Wireless APs to discover the location of the SCALANCE IWLAN Controller during the initial registration process using Options 43, 60, and Option 78. Options 43 and 60 specify the vendor class identifier (VCI) and vendor specific information. Option 78 specifies the location of one or more SLP Directory Agents. For SLP, DHCP should have Option 78 enabled.
- **Service Location Protocol (SLP)** (SLP RFC2608) — Client applications are User Agents and services that are advertised by a Service Agent. In larger installations, a Directory Agent collects information from Service Agents and creates a central repository. The Siemens solution relies on registering “Siemens” as an SLP Service Agent.
- **Domain Name Server (DNS) —** A server used as an alternate mechanism (if present on the enterprise network) for the automatic discovery process. SCALANCE IWLAN Controller, Access Points and Convergence Software relies on the DNS for Layer 3 deployments and for static configuration of Wireless APs. The controller can be registered in DNS, to provide DNS assisted AP discovery. In addition, DNS can also be used for resolving RADIUS server hostnames.
- **Web Authentication Server —** A server that can be used for external Captive Portal and external authentication. The SCALANCE IWLAN Controller has an internal Captive portal presentation page, which allows Web authentication (Web redirection) to take place without the need for an external Captive Portal server.
- **RADIUS Accounting Server** (Remote Access Dial-In User Service) (RFC2866) — A server that is required if RADIUS Accounting is enabled.
- **Simple Network Management Protocol** (SNMP) — A Manager Server that is required if forwarding SNMP messages is enabled.
- **Network infrastructure** — The Ethernet switches and routers must be configured to allow routing between the various services noted above. Routing must also be enabled between multiple SCALANCE IWLAN Controllers for the following features to operate successfully:
  - Availability
  - Mobility
  - Mitigator for detection of rogue access points

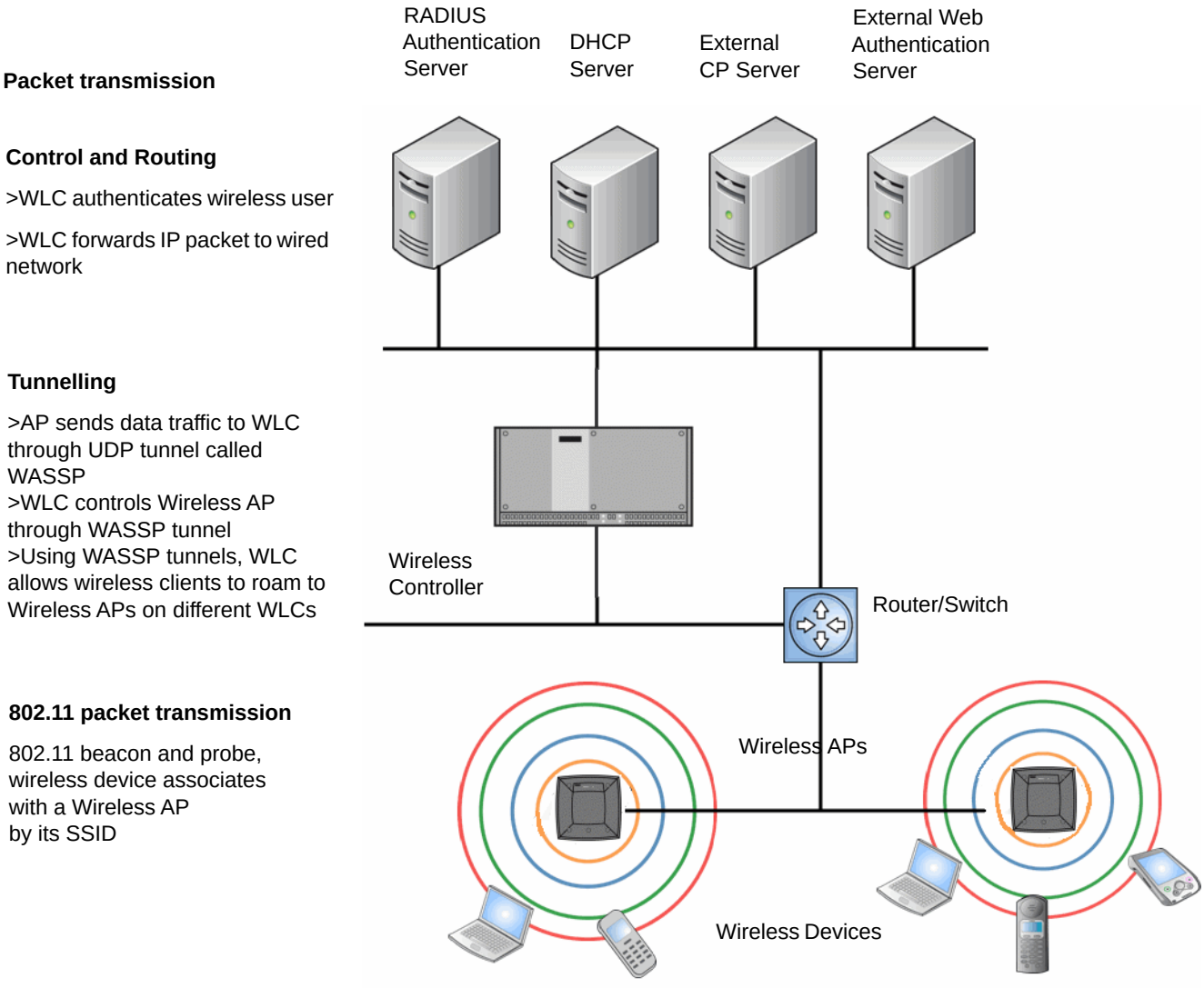
  Some features also require the definition of static routes.
- **Web Browser —** A browser provides access to the SCALANCE IWLAN Controller Management user interface to configure the SCALANCE WLC711.
- **SSH Enabled Device —** A device that supports Secure Shell (SSH) is used for remote (IP) shell access to the system.

- **Zone Integrity** — The Zone integrity server enhances network security by ensuring clients accessing your network are compliant with your security policies before gaining access. Zone Integrity Release 5 is supported.

Network Traffic Flow

Figure 1-3 illustrates a simple configuration with a single SCALANCE IWLAN Controller and two Wireless APs, each supporting a wireless device. A RADIUS server on the network provides authentication, and a DHCP server is used by the Wireless APs to discover the location of the SCALANCE IWLAN Controller during the initial registration process. Network inter-connectivity is provided by the infrastructure routing and switching devices.

Figure 1-3 Traffic Flow Diagram


Packet transmission
Control and Routing
>WLC authenticates wireless user
>WLC forwards IP packet to wired network
Tunnelling
>AP sends data traffic to WLC through UDP tunnel called WASSP
>WLC controls Wireless AP through WASSP tunnel
>Using WASSP tunnels, WLC allows wireless clients to roam to Wireless APs on different WLCs
802.11 packet transmission
802.11 beacon and probe, wireless device associates with a Wireless AP by its SSID
RADIUS Authentication Server
DHCP Server
External CP Server
External Web Authentication Server
Wireless Controller
Router/Switch
Wireless APs
Wireless Devices

Each wireless device sends IP packets in the 802.11 standard to the Wireless AP. The Wireless AP uses a UDP (User Datagram Protocol) based tunnelling protocol. In tunneled mode of operation, it

encapsulates the packets and forwards them to the SCALANCE IWLAN Controller. The SCALANCE IWLAN Controller decapsulates the packets and routes these to destinations on the network. In a typical configuration, access points can be configured to locally bridge traffic (to a configured VLAN) directly at their network point of attachment.

The SCALANCE IWLAN Controller functions like a standard L3 router or L2 switch. It is configured to route the network traffic associated with wireless connected users. The SCALANCE IWLAN Controller can also be configured to simply forward traffic to a default or static route if dynamic routing is not preferred or available.

Network Security

The SCALANCE WLC711 system provides features and functionality to control network access. These are based on standard wireless network security practices.

Current wireless network security methods provide protection. These methods include:

- Shared Key authentication that relies on Wired Equivalent Privacy (WEP) keys
- Open System that relies on Service Set Identifiers (SSIDs)
- 802.1x that is compliant with Wi-Fi Protected Access (WPA)
- Captive Portal based on Secure Sockets Layer (SSL) protocol

The SCALANCE WLC711 system provides the centralized mechanism by which the corresponding security parameters are configured for a group of users.

- Wired Equivalent Privacy (WEP) is a security protocol for wireless local area networks defined in the 802.11b standard
- Wi-Fi Protected Access version 1 (WPA1™) with Temporal Key Integrity Protocol (TKIP)
- Wi-Fi Protected Access version 2 (WPA2™) with Advanced Encryption Standard (AES) and Counter Mode with Cipher Block Chaining Message Authentication Code (CCMP)

Authentication

The SCALANCE IWLAN Controller relies on a RADIUS server, or authentication server, on the enterprise network to provide the authentication information (whether the user is to be allowed or denied access to the network). A RADIUS client is implemented to interact with infrastructure RADIUS servers.

The SCALANCE IWLAN Controller provides authentication using:

- Captive Portal — a browser-based mechanism that forces users to a Web page
- RADIUS (using IEEE 802.1x)

The 802.1x mechanism is a standard for authentication developed within the 802.11 standard. This mechanism is implemented at the wireless port, blocking all data traffic between the wireless device and the network until authentication is complete. Authentication by 802.1x standard uses Extensible Authentication Protocol (EAP) for the message exchange between the SCALANCE IWLAN Controller and the RADIUS server.

When 802.1x is used for authentication, the SCALANCE IWLAN Controller provides the capability to dynamically assign per-wireless-device WEP keys (called per session WEP keys in 802.11). In the case of WPA, the SCALANCE IWLAN Controller is not involved in key assignment. Instead, the controller is involved in the information exchange between RADIUS server and the user's wireless device to negotiate the appropriate set of keys. With WPA2 the material exchange

produces a Pairwise Master Key which is used by the AP and the user to derive their temporal keys. (The keys change over time.)

The SCALANCE WLC711 solution provide a RADIUS redundancy feature that enables you to define a failover RADIUS server in the event that the active RADIUS server becomes unresponsive.

Privacy

Privacy is a mechanism that protects data over wireless and wired networks, usually by encryption techniques.

SCALANCE WLC711 supports the Wired Equivalent Privacy (WEP) standard common to conventional access points.

It also provides Wi-Fi Protected Access version 1 (WPA v.1) encryption, based on Pairwise Master Key (PMK) and Temporal Key Integrity Protocol (TKIP). The most secure encryption mechanism is WPA version 2, using Advanced Encryption Standard (AES).

Virtual Network Services

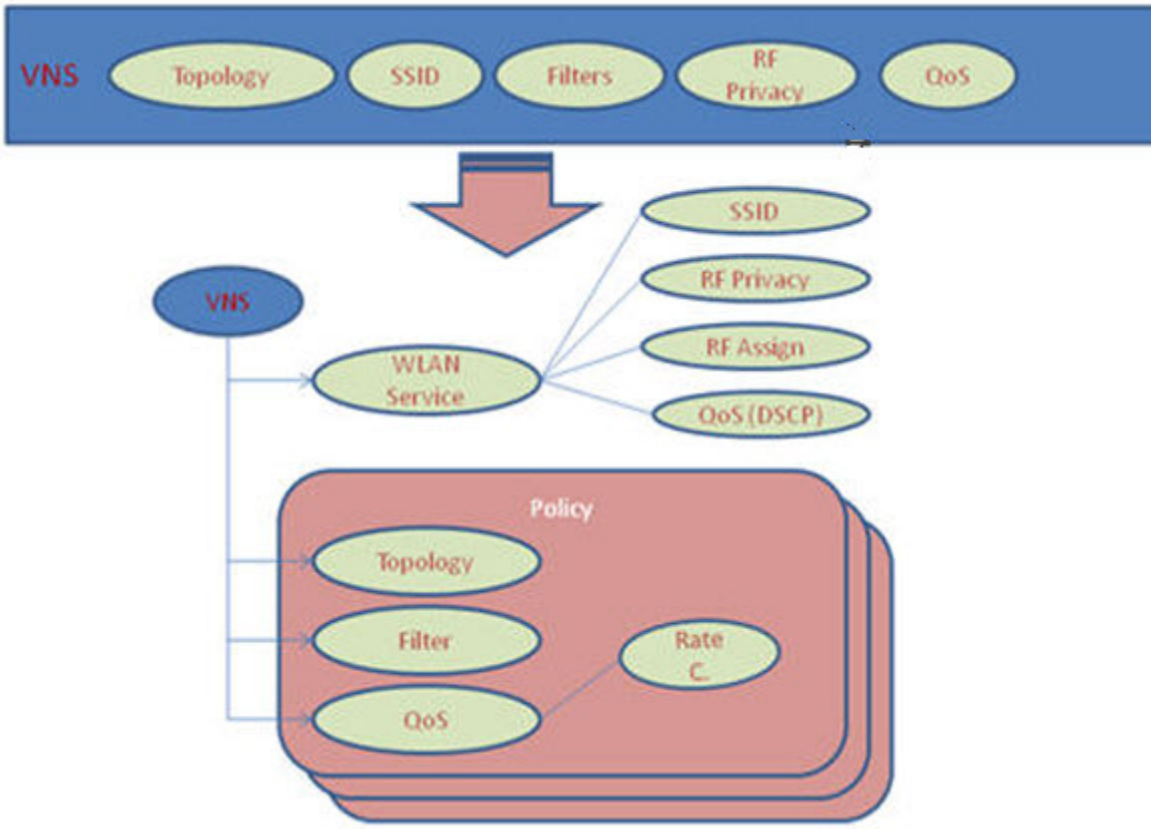
Virtual Network Services (VNS) provide a versatile method of mapping wireless networks to the topology of an existing wired network.

A VNS is the binding of reusable components:

- **WLAN Service** components that define the radio attributes, privacy and authentication settings, and QoS attributes of the VNS
- **Policy** components that define the topology (typically a VLAN), filter rules, and Class of Service applied to the traffic of a station.

Figure 1-4 illustrates the transition of the concept of a VNS to a binding of reusable components.

Figure 1-4 VNS as a Binding of Reusable Components



WLAN Service components and Policy components can be configured separately and associated with a VNS when the VNS is created or modified. Alternatively, they can be configured during the process of creating a VNS.

When VNS components are set up on the SCALANCE IWLAN Controller, among other things, a range of IP addresses is set aside for the SCALANCE IWLAN Controller's DHCP server to assign to wireless devices.

If the OSPF routing protocol is enabled, the SCALANCE IWLAN Controller advertises the routed topologies as reachable segments to the wired network infrastructure. The controller routes traffic between the wireless devices and the wired network.

The SCALANCE IWLAN Controller also supports VLAN-bridged assignment for VNSs. This allows the controller to directly bridge the set of wireless devices associated with a WLAN service directly to a specified core VLAN.

Each SCALANCE IWLAN Controller model can support a specified number of active VNSs, as listed below:

- WLC711 — Up to 8 VNSs

The Wireless AP radios can be assigned to each of the configured WLAN services and, therefore, VNSs in a system. Each Wireless AP can be the subject of 16 service assignments — 8 assignments per radio — which corresponds to the number of SSIDs it can support. Once a radio has all 8 slots assigned, it is no longer eligible for further assignment.

VNS Components

The distinct constituent high-level configurable umbrella elements of a VNS are:

- Topology
- Policy
- Classes of Service
- WLAN Service

Topology

Topologies represent the networks with which the SCALANCE IWLAN Controller and its APs interact. The main configurable attributes of a topology are:

- Name - a string of alphanumeric characters designated by the administrator.
- VLAN ID - the VLAN identifier as specified in the IEEE 802.1Q definition.
- VLAN tagging options.
- Port of presence for the topology on the SCALANCE IWLAN Controller. (This attribute is not required for Routed and Bridged at AP topologies.)
- Interface. This attribute is the IP (L3) address assigned to the SCALANCE IWLAN Controller on the network described by the topology. (Optional.)
- Type. This attribute describes how traffic is forwarded on the topology. Options are:
  - "Physical" - the topology is the native topology of a data plane and it represents the actual Ethernet ports
  - "Management" - the native topology of the SCALANCE IWLAN Controller management port
  - "Routed" - the controller is the routing gateway for the routed topology.
  - "Bridged at Controller" - the user traffic is bridged (in the L2 sense) between wireless clients and the core network infrastructure.
  - "Bridged at AP" - the user traffic is bridged locally at the AP without being redirected to the SCALANCE IWLAN Controller.
- Exception Filters. Specifies which traffic has access to the SCALANCE IWLAN Controller from the wireless clients or the infrastructure network.
- Certificates.
- Multicast filters. Defines the multicast groups that are allowed on a specific topology segment.

Policy

A Policy is a collection of attributes and rules that determine actions taken user traffic accesses the wired network through the WLAN service (associated to the WLAN Service's SSID). Depending upon its type, a VNS can have between one and three Authorization Policies associated with it:

1. Default non-authorized policy — This is a mandatory policy that covers all traffic from stations that have not authenticated. At the administrator's discretion the default non-authorized policy can be applied to the traffic of authenticated stations as well.

2. Default authorized policy — This is a mandatory policy that applies to the traffic of authenticated stations for which no other policy was explicitly specified. It can be the same as the default non-authorized policy.
3. Third party AP policy — This policy applies to the list of MAC addresses corresponding to the wired interfaces of third party APs specifically defined by the administrator to be providing the RF access as an AP WLAN Service. This policy is only relevant when applied to third party AP WLAN Services.

Classes of Service

In general, Class of Service (CoS) refers to a set of attributes that define the importance of a frame while it is forwarded through the network relative to other packets, and to the maximum throughput per time unit that a station or port assigned to a specific policy is permitted. The CoS defines actions to be taken when rate limits are exceeded.

All incoming packets may follow these steps to determine a CoS:

- Classification - identifies the first matching rule that defines a CoS.
- Marking - modifies the L2 802.1p and/or L3 ToS based on CoS definition.
- Rate limiting (drop) is set.

The system limit for the number of CoS profiles on a controller is identical to the number of policies. For example, the maximum number of CoS profiles on a WLC711 is 64.

WLAN Services

A WLAN Service represents all the RF, authentication and QoS attributes of a wireless access service offered by the SCALANCE IWLAN Controller and its APs. A WLAN Service can be one of the following types:

- Standard — A conventional service. Only APs running SCALANCE IWLAN software can be part of this WLAN Service. This type of service can be used as a Bridged at Controller, Bridged at AP, or Routed Topology. This type of service provides access for mobile stations. Policies can be associated with this type of WLAN service to create a VNS.
- Third Party AP — A Wireless Service offered by third party APs. This type of service provides access for mobile stations. Policies can be assigned to this type of WLAN service to create a VNS.
- Dynamic Mesh and WDS (Static Mesh)— This is to configure a group of APs organized into a hierarchy for purposes of providing a Wireless Distribution Service. This type of service is in essence a wireless trunking service rather than a service that provides access for stations. As such, this service cannot have policies attached to it.
- Remote — A service that resides on the edge (foreign) SCALANCE IWLAN Controller. Pairing a remote service with a remoteable service on the designated home SCALANCE IWLAN Controller allows you to provision centralized WLAN Services in the mobility domain. This is known as centralized mobility.

Routing

Routing can be used on the SCALANCE IWLAN Controller to support the VNS definitions. Through the user interface you can configure routing on the SCALANCE IWLAN Controller to use one of the following routing techniques:

- **Static routes** — Use static routes to set the default route of a SCALANCE IWLAN Controller so that legitimate wireless device traffic can be forwarded to the default gateway.
- **Open Shortest Path First** (OSPF, version 2) (RFC2328) — Use OSPF to allow the SCALANCE IWLAN Controller to participate in dynamic route selection. OSPF is a protocol designed for medium and large IP networks with the ability to segment routes into different areas by routing information summarization and propagation. Static Route definition and OSPF dynamic learning can be combined, and the precedence of a static route definition over dynamic rules can be configured by selecting or clearing the **Override dynamic routes** option checkbox.
- **Next-hop routing** — Use next-hop routing to specify a unique gateway to which traffic on a VNS is forwarded. Defining a next-hop for a VNS forces all the traffic in the VNS to be forwarded to the indicated network device, bypassing any routing definitions of the controller's route table.

Mobility and Roaming

In typical simple configurations, APs are set up as bridges that bridge wireless traffic to the local subnet. In bridging configurations, the user obtains an IP address from the same subnet as the AP, assuming no VLAN trunking functionality. If the user roams between APs on the same subnet, it is able to keep using the same IP address. However, if the user roams to another AP outside of that subnet, its IP address is no longer valid. The user's client device must recognize that the IP address it has is no longer valid and re-negotiate a new one on the new subnet. This mechanism does not mandate any action on the user. The recovery procedure is entirely client device dependent. Some clients automatically attempt to obtain a new address on roam (which affects roaming latency), while others will hold on to their IP address. This loss of IP address continuity seriously affects the client's experience in the network, because in some cases it can take minutes for a new address to be negotiated.

The SCALANCE WLC711 solution centralizes the user's network point of presence, therefore abstracting and decoupling the user's IP address assignment from that of the APs location subnet. That means that the user is able to roam across any AP without losing its own IP address, regardless of the subnet on which the serving APs are deployed.

In addition, a SCALANCE IWLAN Controller can learn about other SCALANCE IWLAN Controllers on the network and then exchange client session information. This enables a wireless device user to roam seamlessly between different Wireless APs on different SCALANCE IWLAN Controllers.

Network Availability

The SCALANCE WLC711 solution provides availability against Wireless AP outages, controller outages, and even network outages. The SCALANCE IWLAN Controller in a VLAN bridged topology can potentially allow the user to retain the IP address in a failover scenario, if the VNS/VLAN is common to both controllers. For example, availability is provided by defining a paired controller configuration by which each peer can act as the backup controller for the other's APs. APs in one controller are allowed to fail over and register with the alternate controller.

If the primary SCALANCE IWLAN Controller fails, all of its associated Wireless APs can automatically switch over to another SCALANCE IWLAN Controller that has been defined as the secondary or backup controller. If an AP reboots, the primary SCALANCE IWLAN Controller is restored if it is active. However, active APs will continue to be connected to the backup controller until the administrator releases them back to the primary home controller.

Quality of Service (QoS)

SCALANCE WLC711 solution provides advanced Quality of Service (QoS) management to provide better network traffic flow. Such techniques include:

- **WMM (Wi-Fi Multimedia)** — WMM is enabled per WLAN service. The SCALANCE IWLAN Controller provides centralized management of the AP features. For devices with WMM enabled, the standard provides multimedia enhancements for audio, video, and voice applications. WMM shortens the time between transmitting packets for higher priority traffic. WMM is part of the 802.11e standard for QoS. In the context of the SCALANCE IWLAN Solution, the ToS/DSCP field is used for classification and proper class of service mapping, output queue selection, and priority tagging.
- **IP ToS (Type of Service)** or **DSCP (Diffserv Codepoint)** — The **ToS/DSCP** field in the IP header of a frame indicates the priority and class of service for each frame. Adaptive QoS ensures correct priority handling of client payload packets tunneled between the controller and AP by copying the IP ToS/DSCP setting from client packet to the header of the encapsulating tunnel packet.
- **Rate Control** — Rate Control for user traffic can also be considered as an aspect of QoS. As part of Policy definition, the user can specify (default) policy that includes Ingress and Egress rate control. Ingress rate control applies to traffic generated by wireless clients and Egress rate control applies to traffic targeting specific wireless clients. The bit-rates can be configured as part of globally available profiles which can be used by any particular configuration. A global default is also defined.

Quality of Service (QoS) management is also provided by:

- Assigning high priority to a WLAN service
- Adaptive QoS (automatic and all time feature)
- Support for legacy devices that use SpectraLink Voice Protocol (SVP) for prioritizing voice traffic (configurable)

2

Configuring the SCALANCE IWLAN Controller

This chapter describes the steps involved in the initial configuration and setup, of the SCALANCE IWLAN Controller, including:

For information about...	Refer to page...
System Configuration Overview	2-1
Logging on to the SCALANCE IWLAN Controller	2-4
Wireless Assistant Home Screen	2-4
Working with the Basic Installation Wizard	2-7
Configuring the SCALANCE IWLAN Controller for the First Time	2-12
Using an AeroScout/Ekahau Location-based Solution	2-54
Additional Ongoing Operations of the System	2-58

System Configuration Overview

The following section provides a high-level overview of the steps involved in the initial configuration of your system:

1. Before you begin the configuration process, research the type of WLAN deployment that is required. For example, topology and VLAN IDs, SSIDs, security requirements, and filter policies.
2. Prepare the network servers. Ensure that the external servers, such as DHCP and RADIUS servers (if applicable) are available and appropriately configured.
3. Install the SCALANCE IWLAN Controller. For more information, see the documentation for your SCALANCE IWLAN Controller.
4. Perform the first time setup of the SCALANCE IWLAN Controller on the physical network, which includes configuring the IP addresses of the interfaces on the SCALANCE IWLAN Controller.
   - Create a new physical topology and provide the IP address to be the relevant subnet point of attachment to the existing network.
   - To manage the SCALANCE IWLAN Controller through the interface configured above, select the **Mgmt** checkbox on the **Interfaces** tab.
   - Configure the data port interfaces to be on separate VLANs, matching the VLANs configured in Step 3 above. Ensure also that the tagged vs. untagged state is consistent with the switch port configuration.

- Configure the time zone. Because changing the time zone requires restarting the SCALANCE IWLAN Controller, Siemens recommends that you configure the time zone during the initial installation and configuration of the SCALANCE IWLAN Controller to avoid network interruptions. For more information, see "Configuring Network Time" on page 2-49.
- Apply an activation key file. If an activation key is not applied, the SCALANCE IWLAN Controller functions with some features enabled in demonstration mode. Not all features are enabled in demonstration mode. For example, mobility is not enabled and cannot be used.

NOTICE

Whenever the licensed region changes on the SCALANCE IWLAN Controller, all Wireless APs are changed to **Auto Channel Select** to prevent possible infractions to local RF regulatory requirements. If this occurs, all manually configured radio channel settings will be lost.

5. Configure the SCALANCE IWLAN Controller for remote access:
   - Set up an administration station (laptop) on subnet 192.168.10.0/24. By default, the SCALANCE IWLAN Controller's Management interface is configured with the static IP address 192.168.10.1.
   - Configure the SCALANCE IWLAN Controller's management interface.
   - Configure the data interfaces.
   - Set up the SCALANCE IWLAN Controller on the network by configuring the physical data ports.
   - Configure the routing table.
   - Configure static routes or OSPF parameters, if appropriate to the network.

   For more information, see "Configuring the SCALANCE IWLAN Controller for the First Time" on page 2-12.
6. Configure the traffic topologies your network must support. Topologies represent the Controller's points of network attachment, and therefore VLANs and port assignments need to be coordinated with the corresponding network switch ports. For more information, see "Configuring a Basic Data Port Topology" on page 4-4.
7. Configure policies. Policies are typically bound to topologies. Policy application assigns user traffic to the corresponding network point.
   - Policies define user access rights (filtering or ACL)
   - Polices reference user's rate control profile.

   For more information, see "Configuring Policies" on page 5-1.
8. Configure WLAN services.
   - Define SSID and privacy settings for the wireless link.
   - Select the set of APs/Radios on which the service is present.
   - Configure the method of credential authentication for wireless users (None, Internal CP, External CP, GuestPortal, 802.1x[EAP])

   For more information, see "Configuring WLAN Services" on page 6-1.
9. Create the VNSs.

A VNS binds a WLAN Service to a Policy that will be used for default assignment upon a user's network attachment.

You can create topologies, policies, and WLAN services first, before configuring a VNS, or you can select one of the wizards (such as the VNS wizard), or you can simply select to create new VNS.

The VNS page then allows for in-place creation and definition of any dependency it may require, such as:

- Creating a new WLAN Service
- Creating a new policy
- Creating a new class of service (within a policy)
- Creating a new topology (within a policy)
- Creating new rate controls, and other Class of Service parameters

The default shipping configuration does not ship any pre-configured WLAN Services, VNSs, or Policies.

10. Install, register, and assign APs to the VNS.
    - Confirm the latest firmware version is loaded. For more information, see "Performing Wireless AP Software Maintenance" on page 3-76.
    - Deploy Wireless APs to their corresponding network locations.
    - If applicable, configure a default AP template for common radio assignment, whereby APs automatically receive complete configuration. For typical deployments where all APs are to have the same configuration, this feature will expedite deployment, as an AP will automatically receive full configuration (including VNS-related assignments) upon initial registration with the SCALANCE IWLAN Controller. If applicable, modify the properties or settings of the Wireless APs. For more information, see Chapter 3, **Configuring the Wireless AP**.
    - Connect the Wireless APs to the SCALANCE IWLAN Controller.
    - Once the Wireless APs are powered on, they automatically begin the Discovery process of the SCALANCE IWLAN Controller, based on factors that include:
        - Their Registration mode (on the Wireless AP **Registration** screen)
        - The enterprise network services that will support the discovery process

Logging on to the SCALANCE IWLAN Controller

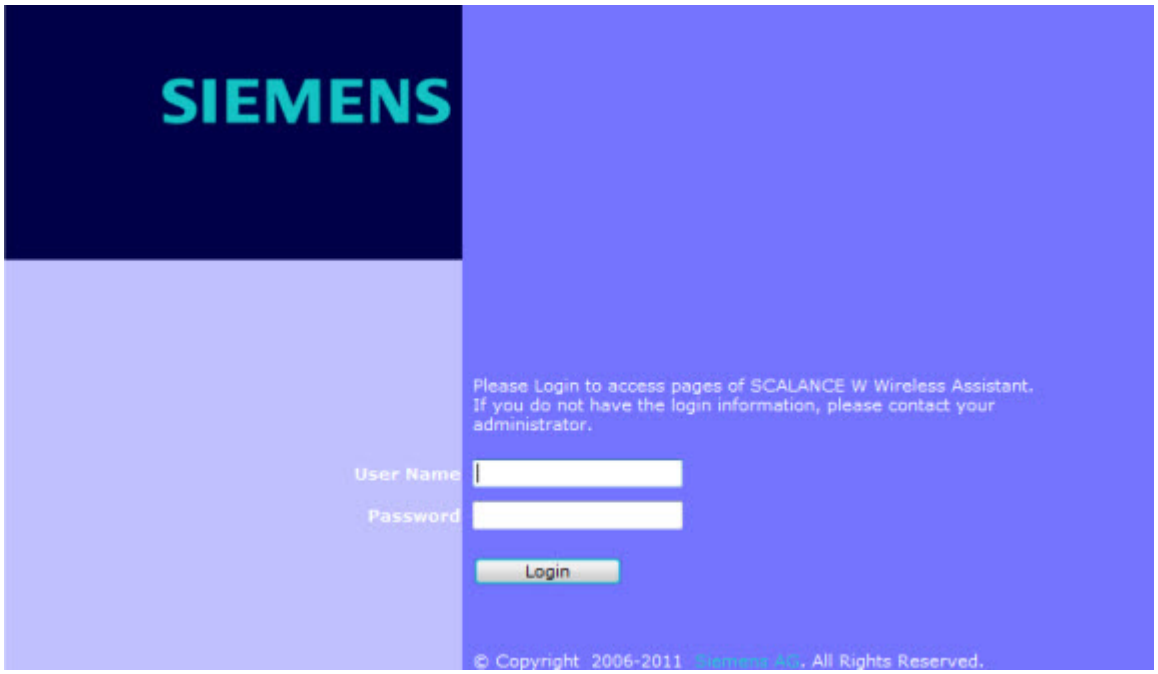
1. Launch your Web browser (Internet Explorer version 6.0 or higher, or FireFox).

   See the V8.01 release notes for the supported Web browsers.

2. In the browser address bar, type the following, using the IP address of your controller:

   `https://192.168.10.1:5825`

   This launches the Wireless Assistant. The login screen is displayed.


SIEMENS
Please Login to access pages of SCALANCE W Wireless Assistant.
If you do not have the login information, please contact your administrator.
User Name
Password
Login
© Copyright 2006-2011 Siemens AG. All Rights Reserved.

3. In the **User Name** box, type your user name.
4. In the **Password** box, type your password.

Note:
The SCALANCE IWLAN Controller default user name is admin. The default password is `abc123`.

5. Click **Login**. The Wireless Assistant Home Screen is displayed.

Wireless Assistant Home Screen

The Wireless Assistant Home Screen provides real-time status information on the current state of the wireless network. Information is grouped under multiple functional areas (Network Status, Admin sessions, and so on) and provides a graphical representation of active AP information (such as the number of wired packets, stations, and total APs).

The top menu bar displays across each page within the Wireless Assistant. Using the top menu bar, you can access Wireless Controllers, Wireless APs, VNS Configurations, the Mitigator and online help. Figure 2-1 shows the Wireless Assistant top menu bar.

Figure 2-1 Wireless Assistant Top Menu Bar

Figure 2-2 shows the Wireless Assistant Home Screen. Table 2-1, describes the home screen headings and descriptions with links to support information within the User Guide.

Figure 2-2 Wireless Assistant Home Screen

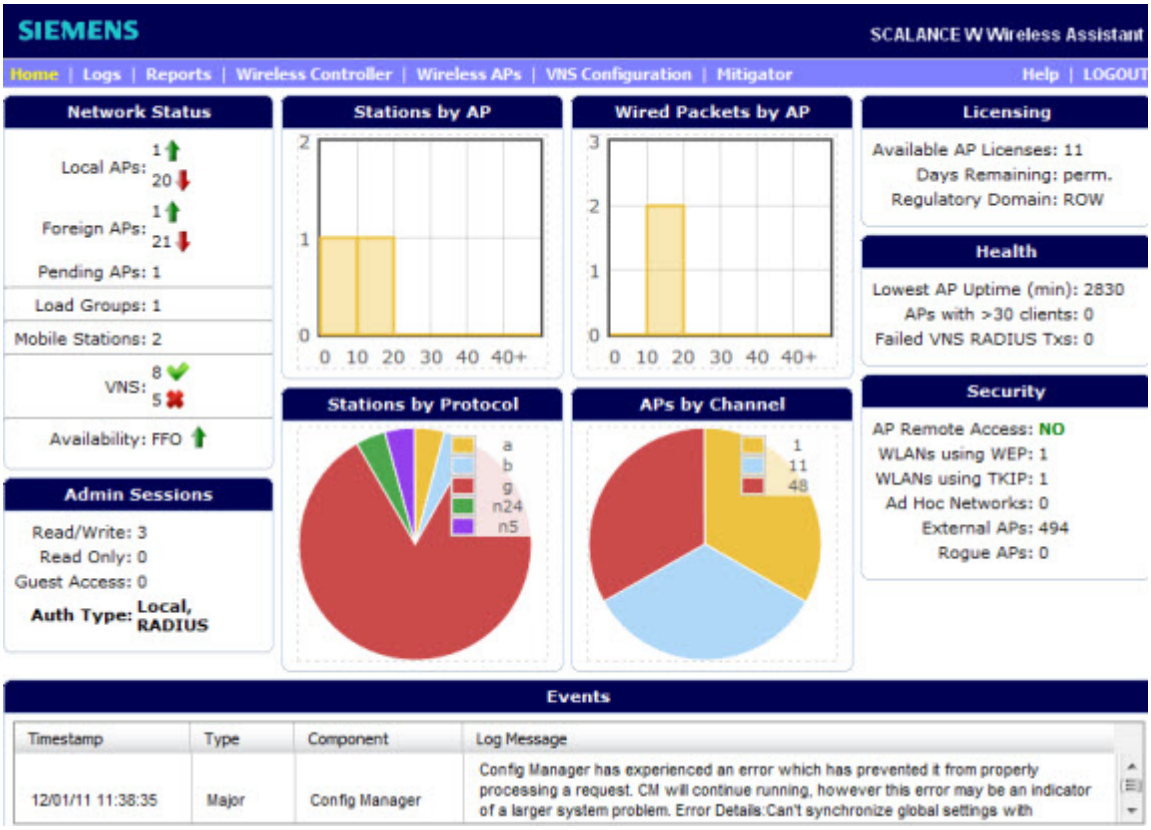


Table 2-1 Wireless Assistant Home Screen Headings

Home Screen Heading	Description
Network Status	Includes real-time totals for the following components: • Local APs - total number of active or inactive local APs. Click the number displayed to open a separate dialog that lists the AP name, serial number, and IP address. • Foreign APs - total number of active or inactive foreign APs. Click the number displayed to open a separate dialog that lists the AP name, serial number, and IP address. • Pending APs - total APs pending verification. Click the number displayed to open a separate dialog that lists the AP name, serial number, and IP address. • Load Groups - total active load groups. Click **Load Groups** to display the Active Wireless Load Groups report. • Mobile Stations - total number of active mobile stations. Click **Mobile Stations** to display the All Active Client report. Within the report, Mobility Tunnels lists the total number of mobility clients. If mobility is not enabled on the controller, then information on Mobility Tunnels will not appear. • VNS - total defined VNSs (enabled and disabled). Click **VNS** to display the total number of enabled and disabled VNS assignments, respectively, configured on the system. • Availability - status of most recent session. Click **Availability** to display the state of availability link (up or down) with indication if fast failover is enabled. If Availability is not enabled on the controller, then information about Availability will not appear.
Admin Sessions	Displays information on the total number of recent administrative activities including: • Read/Write sessions - total number of currently active GUI and CLI (either SSH or serial console ones) Read/Write sessions. • Read-only sessions - total number of currently active GUI and CLI (either SSH or serial console ones) Read only sessions. • Guest Access sessions - total number of currently active GuestPortal Manager sessions that can only be achieved through the GUI. • Auth Type - lists the presently configured login mode. Click each heading to access the Wireless Controller > Login Management screen. For more information, see Configuring the Login Authentication Mode.
Stations by AP	Displays a graphical representation of the total number of active stations and the number of APs. Click the **Stations by AP** heading to access the Active Clients by Wireless AP Report. For more information, see Viewing Statistics for APs.
Stations by Protocol	Displays a graphical representation of the total number of active stations grouped by protocol. Click the **Stations by Protocol** heading to access the All Active Clients Report. For more information, see Viewing Statistics for APs.
Wired Packets by AP	Displays a graphical representation of packet statistics including the total number of packets sent and received, the total packets discarded, and the total number of unicast, multicast, and broadcast packets. Click the **Wired Packets by AP** heading to access the Wired Ethernet Statistics by Wireless Report. For more information, see Viewing Statistics for APs.
APs by Channel	Displays a graphical representation of the total number of active APs grouped by channel. Click the **APs by Channel** heading to access the Active Wireless APs Report. For more information, see Viewing Statistics for APs.

Table 2-1 Wireless Assistant Home Screen Headings (continued)

Home Screen Heading	Description
Licensing	Displays licensing information including: • Available AP Licenses - total number of available licenses. • Days Remaining - number of days remaining on this license key. • Regulatory Domain - Domain information for this license period. Click the **Licensing** heading to access the Wireless Controller > Software Maintenance screen. For more information, see Installing the License Keys.
Health	Displays network health statistics including: • Local AP Uptime (min) • APs with > 30 clients • Failed VNS RADIUS Txs Click each heading to access the Active Wireless APs Report. For more information, see Viewing Statistics for APs.
Security	Displays totals for the following security related statistics: • AP remote access - click to access the Wireless APs > AP Registration page • WLANs using WEP • WLANs using TKIP • Ad Hoc Networks - click to access the Mitigator > Rogue Detection page • External APs - click to access the Mitigator > Rogue Detection page • Rogue APs - click to access the Mitigator > Rogue Detection page For more information, see Defining Properties for the Discovery Process, and Working with Mitigator Scan Results.
Events	Displays major events that impact network performance and efficiency. Each event listed includes a timestamp of the event, the type or classification of the event, which component is impacted by the event, and a log message providing specific information for the event. Click the **Events** heading to access the Logs > Logs & Traces page. For more information, see Available Reports and Statistics.

Working with the Basic Installation Wizard

The SCALANCE WLC711 system provides a basic installation wizard that can help administrators configure the minimum SCALANCE IWLAN Controller settings that are necessary to deploy a functioning SCALANCE IWLAN solution on a network.

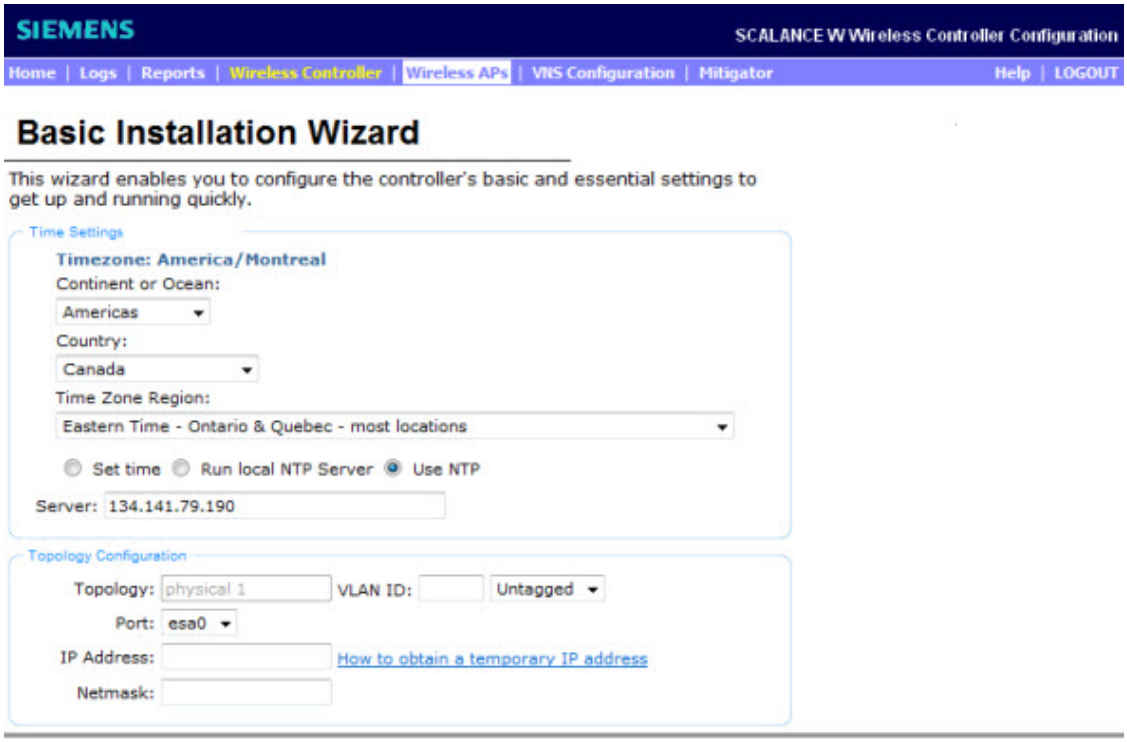
Administrators can use the basic installation wizard to quickly configure the SCALANCE IWLAN Controller for deployment, and then once the installation is complete, continue to revise the SCALANCE IWLAN Controller configuration accordingly.

The basic installation wizard is automatically launched when an administrator logs on to the SCALANCE IWLAN Controller for the first time, including when the system has been reset to the factory default settings. In addition, the basic installation wizard can also be launched at any time from the left pane of the SCALANCE IWLAN Controller Configuration screen.

To Configure the SCALANCE IWLAN Controller with the Basic Installation Wizard:

1. Log on to the SCALANCE IWLAN Controller. For more information, see "Logging on to the SCALANCE IWLAN Controller" on page 2-4.

2. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
3. In the left pane, click **Installation Wizard**. The **Basic Installation Wizard** screen is displayed.


SIEMENS
SCALANCE W Wireless Controller Configuration
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator | Help | LOGOUT
Basic Installation Wizard
This wizard enables you to configure the controller's basic and essential settings to get up and running quickly.
Time Settings
Timezone: America/Montreal
Continent or Ocean:
Americas
Country:
Canada
Time Zone Region:
Eastern Time - Ontario & Quebec - most locations
Set time
Run local NTP Server
Use NTP
Server: 134.141.79.190
Topology Configuration
Topology: physical 1
VLAN ID:
Untagged
Port: esa0
IP Address:
How to obtain a temporary IP address
Netmask:

4. In the **Time Settings** section, configure the SCALANCE IWLAN Controller timezone:
   - **Continent or Ocean** — Click the appropriate large-scale geographic grouping for the time zone.
   - **Country** — Click the appropriate country for the time zone. The contents of the drop-down list change, based on the selection in the **Continent or Ocean** drop-down list.
   - **Time Zone Region** — Click the appropriate time zone region for the selected country.
5. To configure the SCALANCE IWLAN Controller's time, do one of the following:
   - To manually set the SCALANCE IWLAN Controller time, use the **Year**, **Month**, **Day**, **HR**, and **Min**. drop-down lists to specify the time.
   - To use the SCALANCE IWLAN Controller as the NTP time server, select the **Run local NTP Server** option.
   - To use NTP to set the SCALANCE IWLAN Controller time, select the **Use NTP** option, and then type the IP address of an NTP time server that is accessible on the enterprise network.

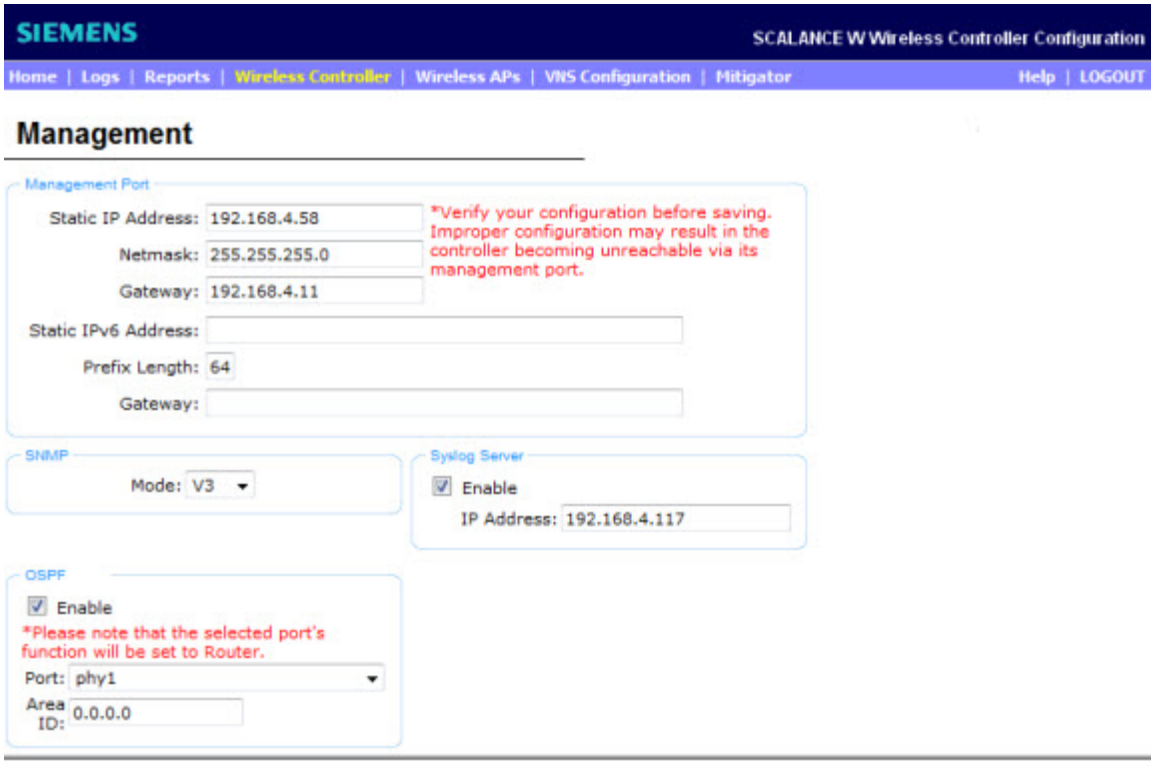
   The Network Time Protocol is a protocol for synchronizing the clocks of computer systems over packet-switched data networks.
6. In the **Server** field, enter the IP address or Domain Name for the NTP server.

Note:
You can configure up to three DNS servers. The Server Address field supports both IPv4 and IPv6 addresses.

7. In the **Topology Configuration** section, click the physical interface of the SCALANCE IWLAN Controller you want to assign as a data port. The system assigns default **IP Address** and **Netmask** values for the data port. If applicable, type a different IP address and netmask for the selected physical interface.

   For information on how to obtain a temporary IP address from the network, click **How to obtain a temporary IP address**.

8. Click **Next**. The **Management** screen is displayed.



9. In the **Management Port** section, confirm the port configuration values that were defined when the SCALANCE IWLAN Controller was physically deployed on the network. If applicable, edit these values:
   - **Static IP Address** — Displays the IPv4 address for the SCALANCE IWLAN Controller's management port. Revise this as appropriate for the enterprise network.
   - **Netmask** — Displays the appropriate subnet mask for the IP address to separate the network portion from the host portion of the address.
   - **Gateway** — Displays the default gateway of the network.
   - **Static IPv6 Address** — Displays the IPv6 address for the SCALANCE IWLAN Controller's management port. Revise this as appropriate for the enterprise network.
   - **Prefix Length** — Length of the IPv6 prefix. Maximum is 64 bits.
   - **Gateway** — Displays the default gateway of the network.

10. In the **SNMP** section, click **V2c** or **V3** in the **Mode** drop-down list to enable SNMP, if applicable. Only one mode can be supported on the controller at a time.

If you selected **V2c**, do the following (these parameters do not apply to **V3**):

- **Read Community** — Type the password that is used for read-only SNMP communication.
- **Write Community** — Type the password that is used for write SNMP communication.
- **Trap Destination** — Type the IP address of the server used as the network manager that will receive SNMP messages.

Note:
The Trap Destination Address field supports both IPv4 and IPv6 addresses.

11. In the **OSPF** section, select the **Enable** checkbox to enable OSPF, if applicable. Use OSPF to allow the SCALANCE IWLAN Controller to participate in dynamic route selection. OSPF is a protocol designed for medium and large IP networks with the ability to segment routes into different areas by routing information summarization and propagation.

    Do the following:

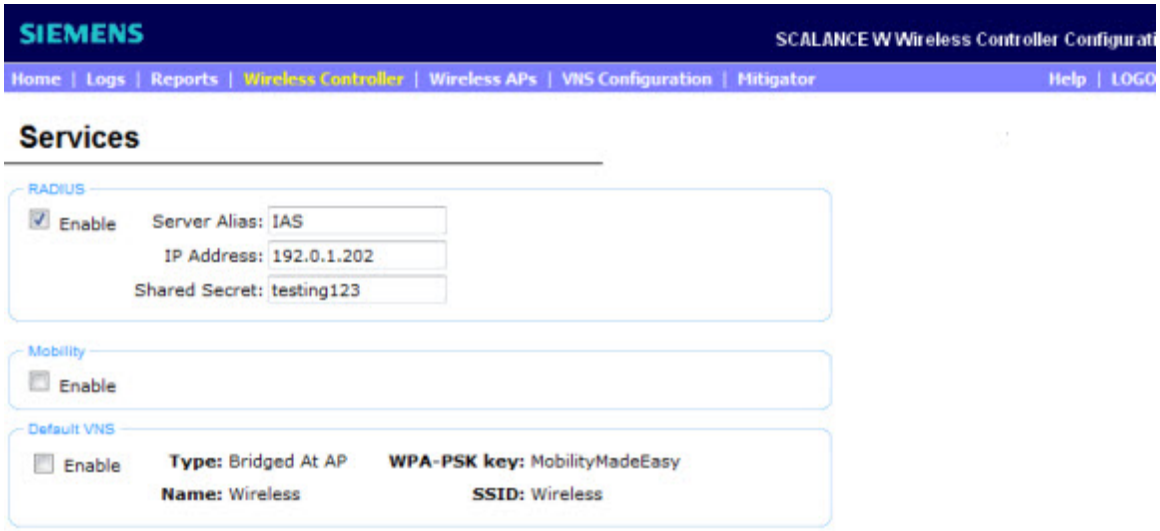
    - **Port** — Click the physical interface of the SCALANCE IWLAN Controller you want to assign as a router port.
    - **Area ID** — Type the desired area. Area 0.0.0.0 is the main area in OSPF.

12. In the **Syslog Server** section, select the **Enable** checkbox to enable the syslog protocol for the SCALANCE IWLAN Controller, if applicable. Syslog is a protocol used for the transmission of event notification messages across networks.

    In the **IP Address** box, type the IP address of the syslog server.

Note:
The Syslog Server IP Address field supports both IPv4 and IPv6 addresses.

13. Click **Next**. The **Services** screen is displayed.



14. In the **RADIUS** section, select the **Enable** checkbox to enable RADIUS login authentication, if applicable. RADIUS login authentication uses a RADIUS server to authenticate user login

attempts. RADIUS is a client/server authentication and authorization access protocol used by a network access server (NAS) to authenticate users attempting to connect to a network device.

Do the following:

- **Server Alias** — Type a name that you want to assign to the RADIUS server. You can type a name or IP address of the server.
- **IP Address** — Type the RADIUS server's hostname or IP address.
- **Shared Secret** — Type the password that will be used to validate the connection between the SCALANCE IWLAN Controller and the RADIUS server.

15. In the **Mobility** section, select the **Enable** checkbox to enable the SCALANCE IWLAN Controller mobility feature, if applicable. Mobility allows a wireless device user to roam seamlessly between different Wireless APs on the same or different SCALANCE IWLAN Controllers.

    A dialog is displayed informing you that NTP is required for the mobility feature and prompting you to confirm you want to enable mobility.

Note:
If the SCALANCE IWLAN Controller is configured as a mobility agent, it will act as an NTP client and use the mobility manager as the NTP server. If the SCALANCE IWLAN Controller is configured as a mobility manager, the SCALANCE IWLAN Controller's local NTP will be enabled for the mobility domain.

Click **OK** to continue, and then do the following:

Role — Select the role for the SCALANCE IWLAN Controller, **Manager** or **Agent**. One SCALANCE IWLAN Controller on the network is designated as the mobility manager and all other SCALANCE IWLAN Controllers are designated as mobility agents.

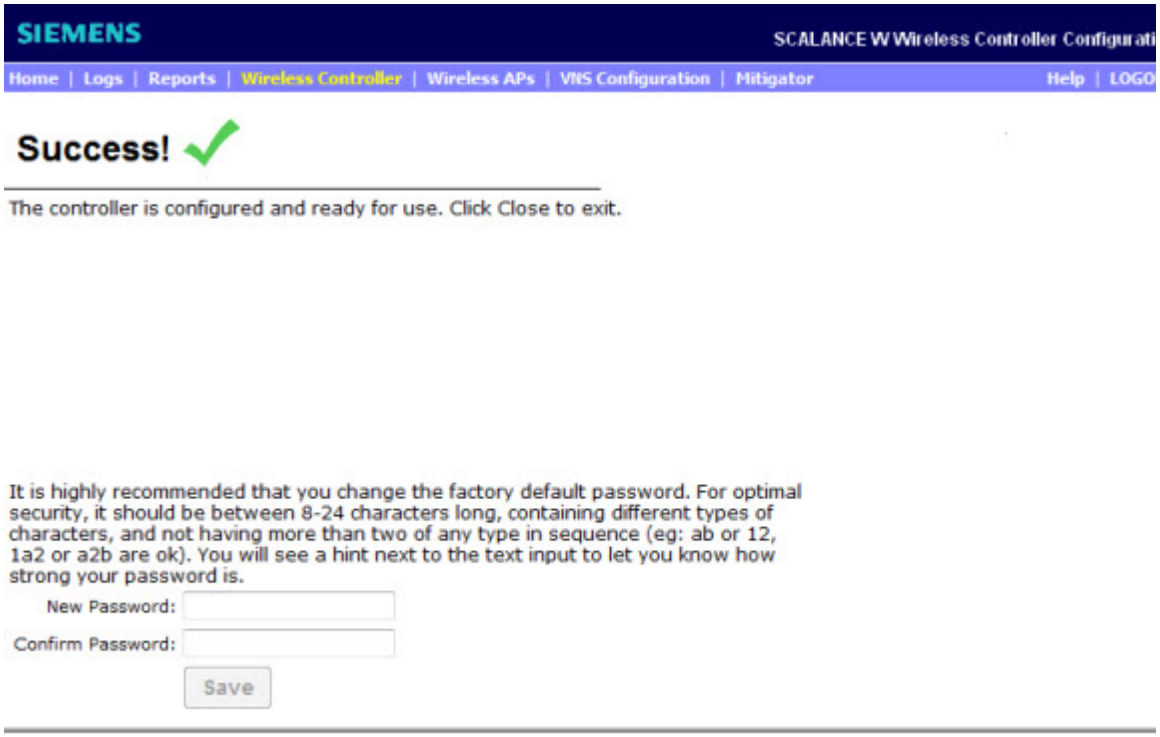
Port — Click the interface on the SCALANCE IWLAN Controller to be used for communication between mobility manager and mobility agent. Ensure that the selected interface is routable on the network. For more information, see Chapter 13, **Configuring Mobility**.

Manager IP — Type the IP address of the mobility manager port if the SCALANCE IWLAN Controller is configured as the mobility agent.

16. In the **Default VNS** section, select the **Enable** checkbox to enable a default VNS for the SCALANCE IWLAN Controller. The default VNS parameters are displayed. Refer to "Virtual Network Services" on page 1-9 for more information about the default VNS.
17. Click **Finish**. The **Success** screen is displayed. Siemens recommends that you change the factory default administrator password. Do the following:
    - **New Password** — Type a new administrator password.
    - **Confirm Password** — Type the new administrator password again.
18. Click **Save**. Your new password is saved.
19. Click **OK**, and then click **Close**. The SCALANCE W Wireless Assistant home screen is displayed.

Note:
The SCALANCE IWLAN Controller reboots after you click **Save** if the time zone is changed during the Basic Install Wizard. If the IP address of the management port is changed during the configuration with the Basic

Install Wizard, the SCALANCE W Wireless Assistant session is terminated and you will need to log back in with the new IP address.


SIEMENS
SCALANCE W Wireless Controller Configurati
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGO
Success!
The controller is configured and ready for use. Click Close to exit.
It is highly recommended that you change the factory default password. For optimal security, it should be between 8-24 characters long, containing different types of characters, and not having more than two of any type in sequence (eg: ab or 12, 1a2 or a2b are ok). You will see a hint next to the text input to let you know how strong your password is.
New Password:
Confirm Password:
Save

Configuring the SCALANCE IWLAN Controller for the First Time

As soon as the SCALANCE IWLAN Controller is deployed, you should perform a series of configuration tasks. These tasks include:

- Changing the Administrator Password
- Applying Product License Keys
- Setting Up the Data Ports
- Setting Up Internal VLAN ID and Multicast Support
- Setting Up Static Routes
- Setting Up OSPF Routing
- Configuring Filtering at the Interface Level
- Protecting the Controller's Interfaces and Internal Captive Portal Page
- Configuring the Login Authentication Mode
- Configuring SNMP
- Configuring Network Time
- Configuring DNS Servers for Resolving Host Names of NTP and RADIUS Servers

Although the basic installation wizard has already configured some aspects of the SCALANCE IWLAN Controller deployment, you can continue to revise the SCALANCE IWLAN Controller configuration according to your network needs.

Changing the Administrator Password

Siemens recommends that you change your default administrator password once your system is deployed. The SCALANCE IWLAN Controller default password is `abc123`. When the SCALANCE IWLAN Controller is installed and you elect to change the default password, the new password must be a minimum of eight characters.

The minimum eight character password length is not applied to existing passwords. For example, if a six character password is already being used and an upgrade of the software is performed, the software does not require the password to be changed to a minimum of eight characters. However, once the upgrade is completed and a new account is created, or the password of an existing account is changed, the new password length minimum will be enforced.

To Change the Administrator Password:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **Login Management**.
3. In the Full Administrator table, click the administrator user name.
4. In the **Password** box, type the new administrator password.
5. In the **Confirm Password** box, type the new administrator password again.
6. Click **Change Password**.

Note:
The SCALANCE IWLAN Controller provides you with local login authentication mode, the RADIUS-based login authentication mode, and combinations of the two authentication modes. The local login authentication is enabled by default. For more information, see “Configuring the Login Authentication Mode” on page 2-36.

Applying Product License Keys

The SCALANCE IWLAN Controller’s license system works on simple software-based key strings. A key string consists of a series of numbers and/or letters. Using these key strings, you can enhance the capacity of the SCALANCE IWLAN Controller to manage additional Wireless APs.

The key strings can be classified into the following variants:

- **Activation Key** — Activates the software. The WLC711 is shipped with a preinstalled activation Key.**Option Key** — Activates the optional feature:

Note: Capacity Enhancement Key — Enhances the capacity of the SCALANCE IWLAN Controller to manage 16 additional Wireless APs.
The External Captive Portal Key is not supported in the current version of WLC711.

If the SCALANCE IWLAN Controller detects multiple license violations, such as capacity enhancement, a grace period counter will start from the moment the first violation occurred. The SCALANCE IWLAN Controller will generate event logs for every violation. The only way to leave the grace period is to clear all outstanding license violations.

The SCALANCE IWLAN Controller can be in an unlicensed state for an infinite period. However, if you install a temporary activation key, the unlicensed state is terminated. After the validity of a temporary activation key and the related grace period expire, the SCALANCE IWLAN Controller will generate event logs every 15 minutes, indicating that an appropriate license is required for the current software version. In addition, you will not be able to edit the Virtual Network Services (VNS) parameters.

Installing the License Keys

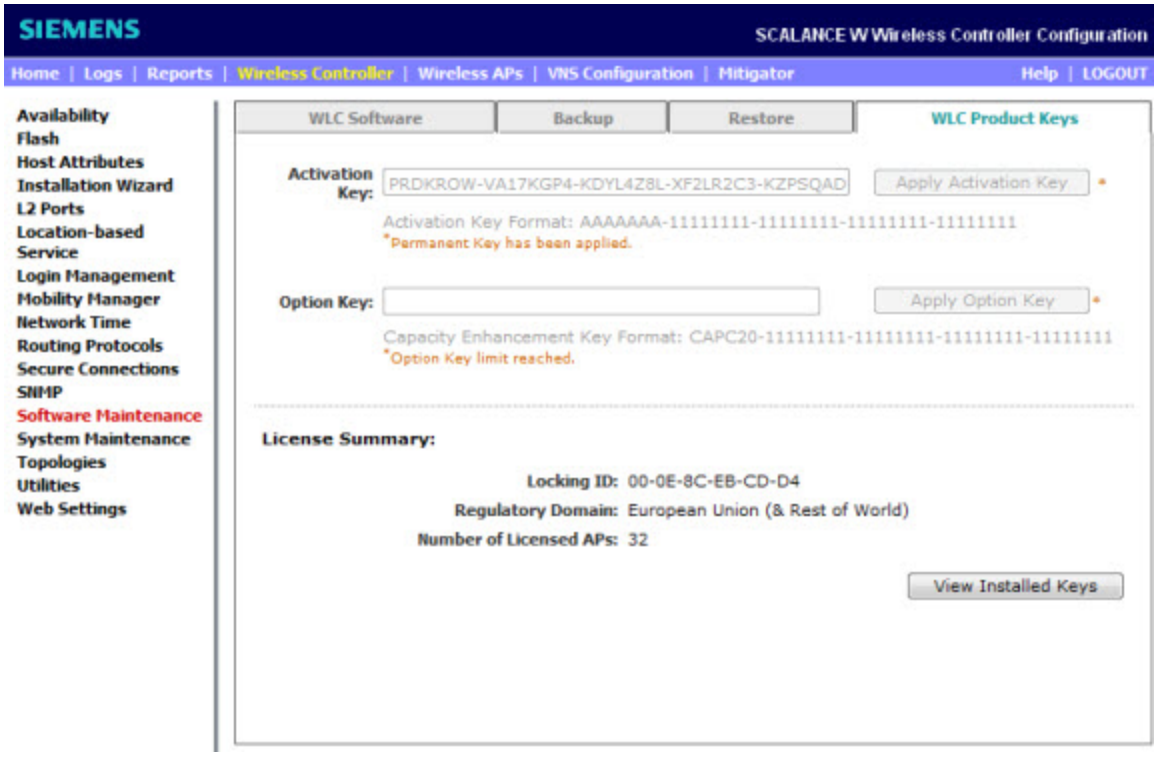
This section describes how to install the license key on the SCALANCE IWLAN Controller. It does not explain how to generate the license key. For information on how to generate the license key, see the SCALANCE IWLAN *License Certificate*, which is sent to you via traditional mail.

You have to type the license keys on the SCALANCE IWLAN Assistant GUI.

To Install the License Keys:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **Software Maintenance**.
3. Click the **WLC Product Keys** tab.

   The bottom pane displays the license summary.



4. If you are installing a capacity enhancement, type the key in the **Option Key** box, and then click the **Apply Option Key** button.
5. To view installed keys, click **View Installed Keys**.

Setting Up the Data Ports

A new SCALANCE IWLAN Controller is shipped from the factory with all its data ports set up. Support of management traffic is disabled on all data ports. By default, data interface states are enabled. A disabled interface does not allow data to flow (receive/transmit).

Physical ports are represented by the L2 (Ethernet) Ports. The L2 port can be accessed from **L2 Ports** tabs under SCALANCE IWLAN Controller Configuration. The L2 Ports cannot be removed

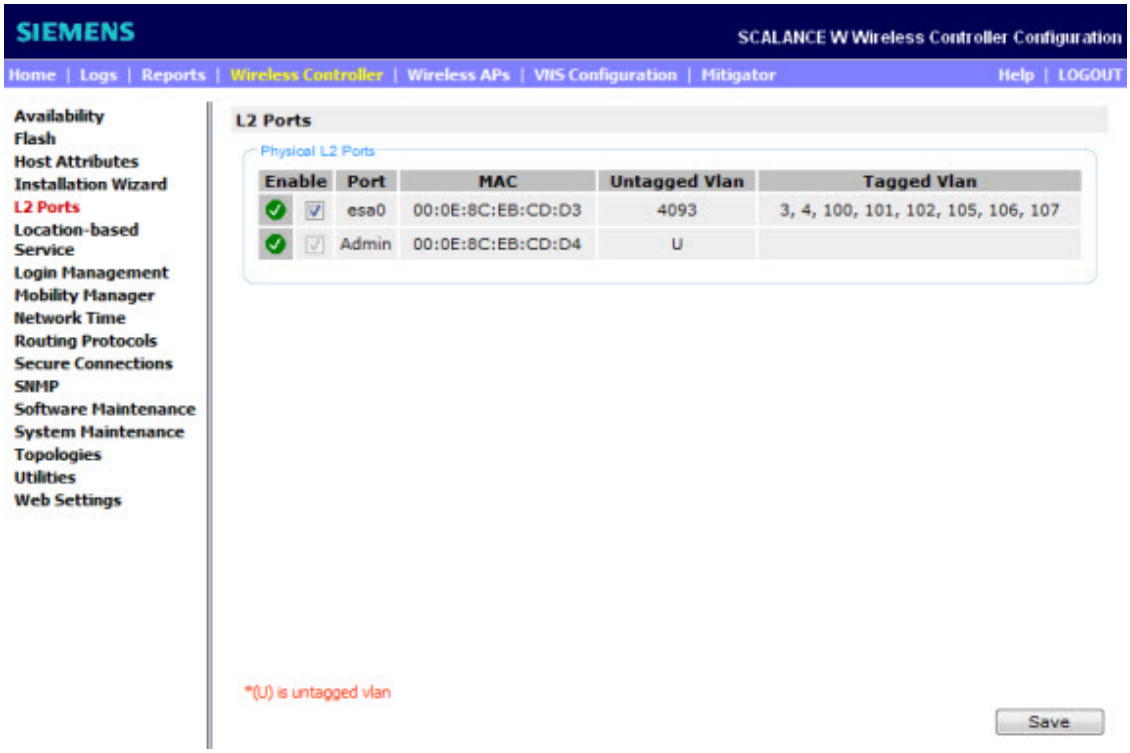
from the system but their operational status can be changed. Refer to Viewing and Changing the L2 Ports Information.

Note:
You can redefine a data port to function as a **Third-Party AP Port**. Refer to Viewing and Changing the Physical Topologies for more information.

Viewing and Changing the L2 Ports Information

To View and Change the L2 Port Information:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **L2 Ports**. The **L2 Ports** tab is displayed.



The **L2 Ports** tab presents the Physical (that is, Ethernet) and Link Aggregation LAG (peer to peer) data ports that exist on the SCALANCE IWLAN Controller. These ports cannot be deleted and new ones cannot be created.

Physical:

– WLC711 — One data port, displayed as **esa0**.

Also an "Admin" port is created by default. This represents a physical port, separate from the other data ports, being used for management connectivity. For more information, see "Configuring the Admin Port" on page 4-2.

Parameters displayed for the L2 Ports are:

– Operational status, represented graphically with a green checkmark (UP) or red X (DOWN). This is the only configurable parameter.

- Port name, as described above.
- MAC address, as per Ethernet standard.
- Untagged VLAN, displays the associated untagged VLAN ID. This ID is unique among topologies.
- Tagged VLAN, displays the associated tagged VLAN ID.

Note:
Refer to Viewing and Changing the Physical Topologies for more information about L2 port topologies.

3. If desired, change the operational status by clicking the Enable checkbox.

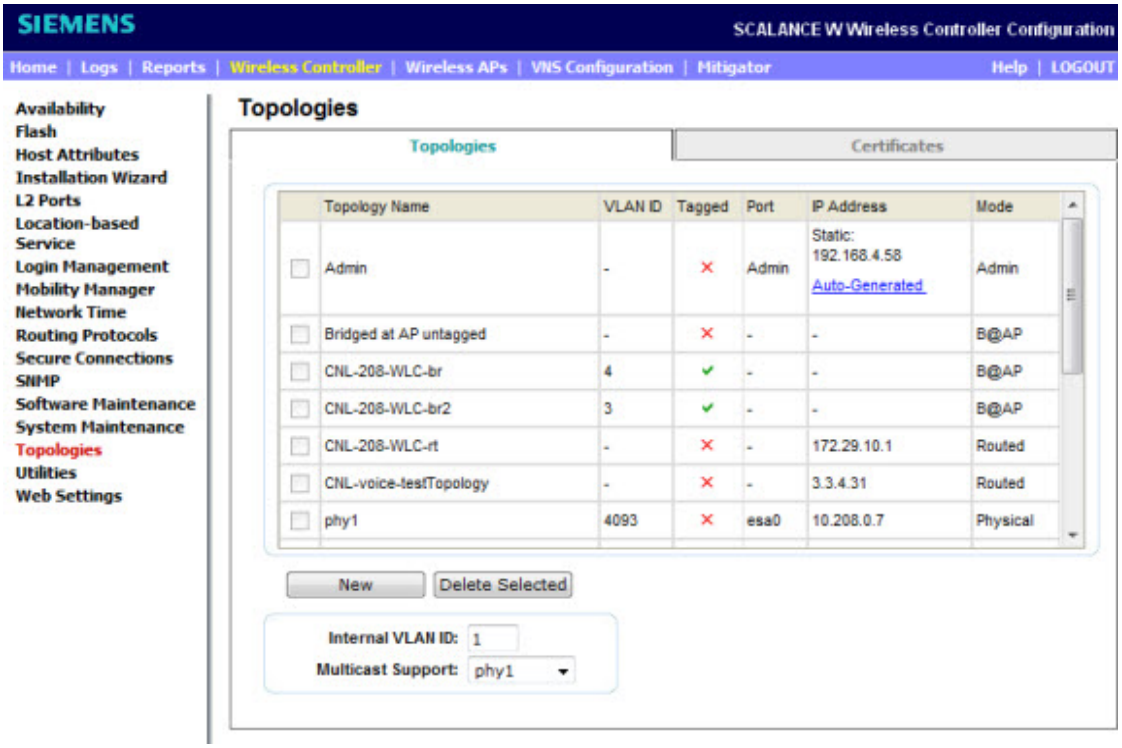
   You can change the operational state for each port. By default, data interface states are enabled. If they are not enabled, you can enable them individually. A disabled interface does not allow data to flow (receive/transmit).

Viewing and Changing the Physical Topologies

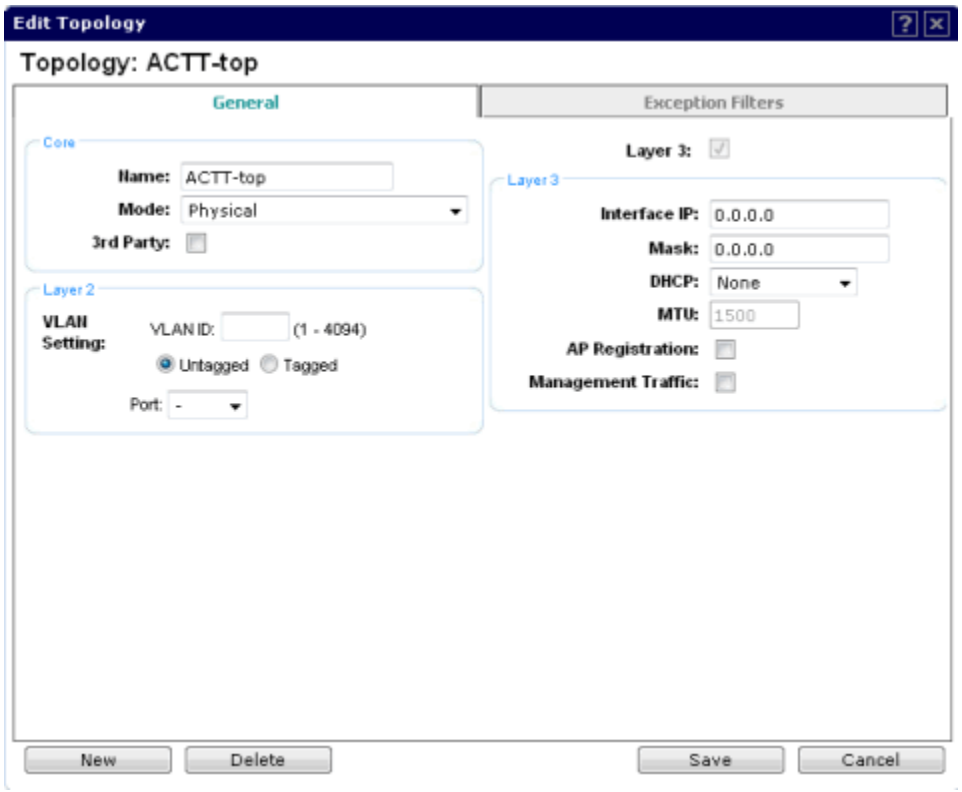
To View and Change the L2 Port Topologies:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **Topologies**. The **Topologies** tab is displayed.

   An associated topology entry is created by default for each L2 Port with the same name.



3. To change any of the associated parameters, click on the topology entry to be modified. An "Edit Topology" pop up window appears.



For the data ports predefined in the system, **Name** and **Mode** are not configurable.

4. Optionally, configure one of the physical topologies for Third Party AP connectivity by clicking the **3rd Party AP Topology** checkbox.

   You must configure a topology to which you will be connecting third-party APs by checking this box. Only one topology can be configured for third-party APs.

   Third-party APs must be deployed within a segregated network for which the SCALANCE IWLAN Controller becomes the single point of access (i.e., routing gateway). When you define a third-party AP topology, the interface segregates the third-party AP from the remaining network.

5. To configure an interface for VLAN assignment, configure the **VLAN Setting**s in the **Layer 2** box.

   When you configure a SCALANCE IWLAN Controller port to be a member of a VLAN, you must ensure that the VLAN configuration (VLAN ID, tagged or untagged attribute, and Port ID) is matched with the correct configuration on the network switch.

6. To replicate topology settings, click **Synchronize** in the **Status** box.

7. If the desired IP configuration is different from the one displayed, change the **Interface IP** and **Mask** accordingly in the **Layer 3** box.

   For this type of data interface, the Layer 3 check box is selected automatically. This allows for IP Interface and subnet configuration together with other networking services.

8. The **MTU** value specifies the Maximum Transmission Unit or maximum packet size for this topology. The fixed value is 1500 bytes for physical topologies.

If you are using OSPF, be sure that the MTU of all the interfaces in the OSPF link match.

Note:
If the routed connection to an AP traverses a link that imposes a lower MTU than the default 1500 bytes, the SCALANCE IWLAN Controller and AP participate in automatic MTU discovery and adjust their settings accordingly.At the SCALANCE IWLAN Controller, MTU adjustments are tracked on a per AP basis. If the SCALANCE IWLAN software cannot discover the MTU size, it enforces the static MTU size.

9. To enable AP registration through this interface, select the **AP Registration** checkbox.

   Wireless APs use this port for discovery and registration. Other controllers can use this port to enable inter-controller device mobility if this port is configured to use SLP or the SCALANCE IWLAN Controller is running as a manager and SLP is the discovery protocol used by the agents.

10. To enable management traffic, select the **Management Traffic** checkbox. Enabling management provides access to SNMP (v2, V3, get), SSH, and HTTPs management interfaces.

Note:
This option does not override the built-in protection filters on the port.
The built-in protection filters for the port, which are restrictive in the types of packets that are allowed to reach the management plane, are extended with a set of definitions that allow for access to system management services through that interface (SSH, SNMP, HTTPS:5825).

11. To enable the local DHCP Server on the SCALANCE IWLAN Controller, in the **DHCP** box, select **Local Server**. Then, click on the **Configure** button to open the DHCP configuration pop up window.

Note:
The local DHCP Server is useful as a general purpose DHCP Server for small subnets.

a. In the **Domain Name** box, type the name of the domain that you want the Wireless APs to use for DNS Server's discovery.

b. In the **Lease (seconds) default** box, type the time period for which the IP address will be allocated to the Wireless APs (or any other device requesting it).

c. In the **Lease (seconds) max** box, type the maximum time period in seconds for which the IP address will be allocated to the Wireless APs.

d. In the **DNS Servers** box, type the DNS Server's IP address if you have a DNS Server.

e. In the **WINS** box, type the WINS Server's IP address if you have a WINS Server.

Note:
You can type multiple entries in the **DNS Servers** and **WINS** boxes. Each entry must be separate by a comma. These two fields are not mandatory to enable the local DHCP feature.

f. In the **Gateway** box, type the IP address of the default gateway.

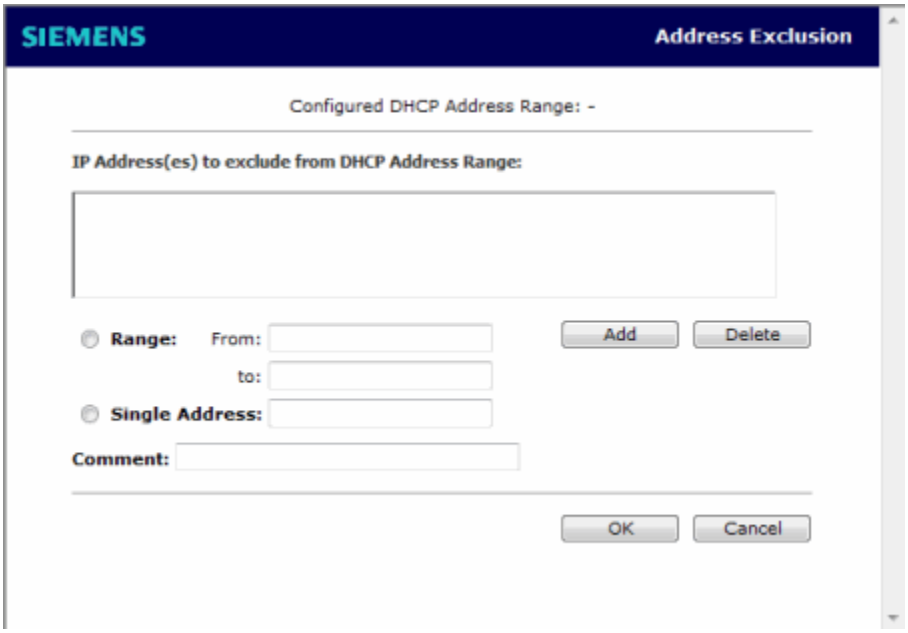
Note:
Since the SCALANCE IWLAN Controller is not allowed to be the gateway for the segment, including Wireless APs, you cannot use the Interface IP address as the gateway address.

g. Configure the address range from which the local DHCP Server will allocate IP addresses to the Wireless APs.

- In the **Address Range: from** box, type the starting IP address of the IP address range.
- In the **Address Range: to** box, type the ending IP address of the IP address range.

h. Click the **Exclusion(s)** button to exclude IP addresses from allocation by the DHCP Server. The **DHCP Address Exclusion** window opens.

The SCALANCE IWLAN Controller automatically adds the IP addresses of the Interfaces (Ports), and the default gateway to the exclusion list. You cannot remove these IP addresses from the exclusion list.



- Select the **Range** radio button. In the **From** box, type the starting IP address of the IP address range that you want to exclude from the DHCP allocation.
- In the **To** box, type the ending IP address of the IP address range that you want to exclude from the DHCP allocation.

- To exclude a single address, select the **Single Address** radio button and type the IP address in the adjacent box.
- In the **Comment** box, type any relevant comment. For example, you can type the reason for which a certain IP address is excluded from the DHCP allocation.
- Click on **Add**. The excluded IP addresses are displayed in the **IP Address(es) to exclude from DHCP Address Range** box.
- To delete a IP Address from the exclusion list, select it in the **IP Address(es) to exclude from DHCP Range** box, and then click **Delete**.
- To save your changes, click **OK**.

i. Click **Close** to close the DHCP configuration window.

Note:
The **Broadcast (B'cast) Address** field is view only. This field is computed from the mask and the IP addresses.

12. You are returned to the L2 port topology edit window.

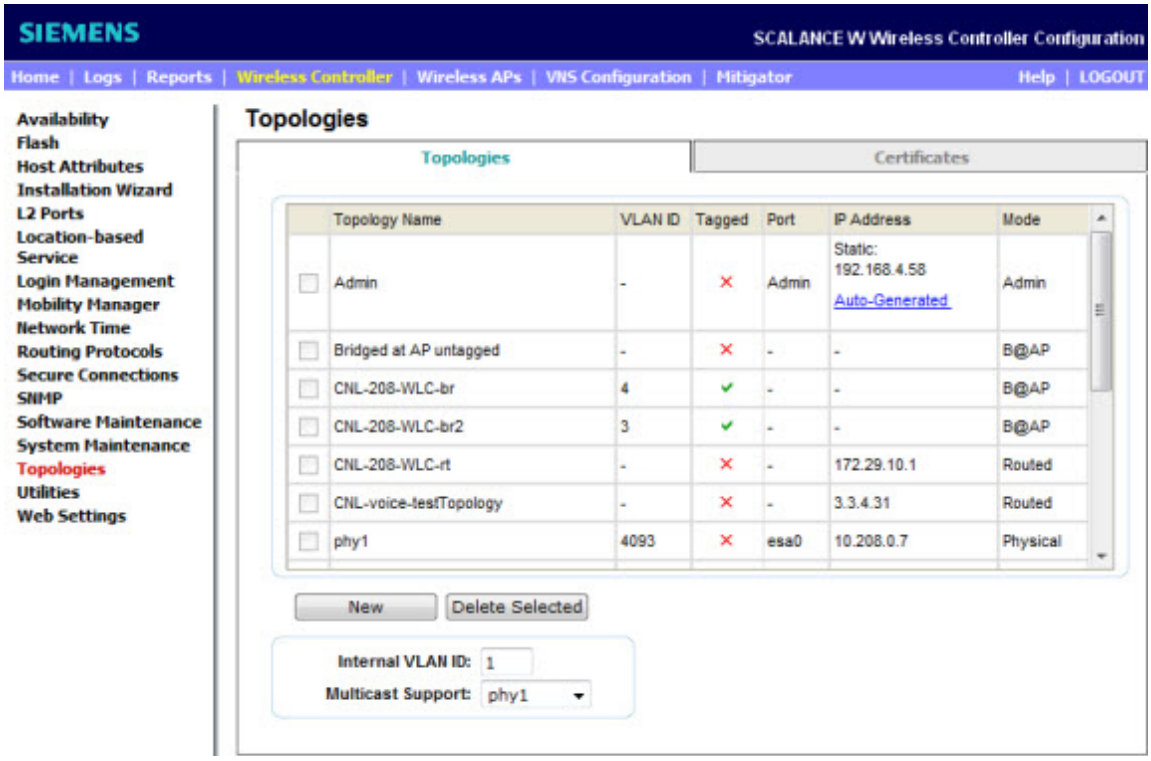
Setting Up Internal VLAN ID and Multicast Support

You can configure the Internal VLAN ID, and enable multicast support. The internal VLAN used only internally and is not visible on the external traffic. The physical topology used for multicast is represented by a physical topology to/from which the multicast traffic is forwarded in conjunction with the virtual routed topologies (and VNSs) configured on the controller. Please note that no multicast routing is available at this time.

To configure the Internal VLAN ID and enable multicast support:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.

2. In the left pane, click **Topologies**. The **Topologies** tab is displayed.



3. In the **Internal VLAN ID** box, type the internal VLAN ID.
4. From the **Multicast Support** drop-down list, select the desired physical topology.
5. To save your changes, click **Save**.

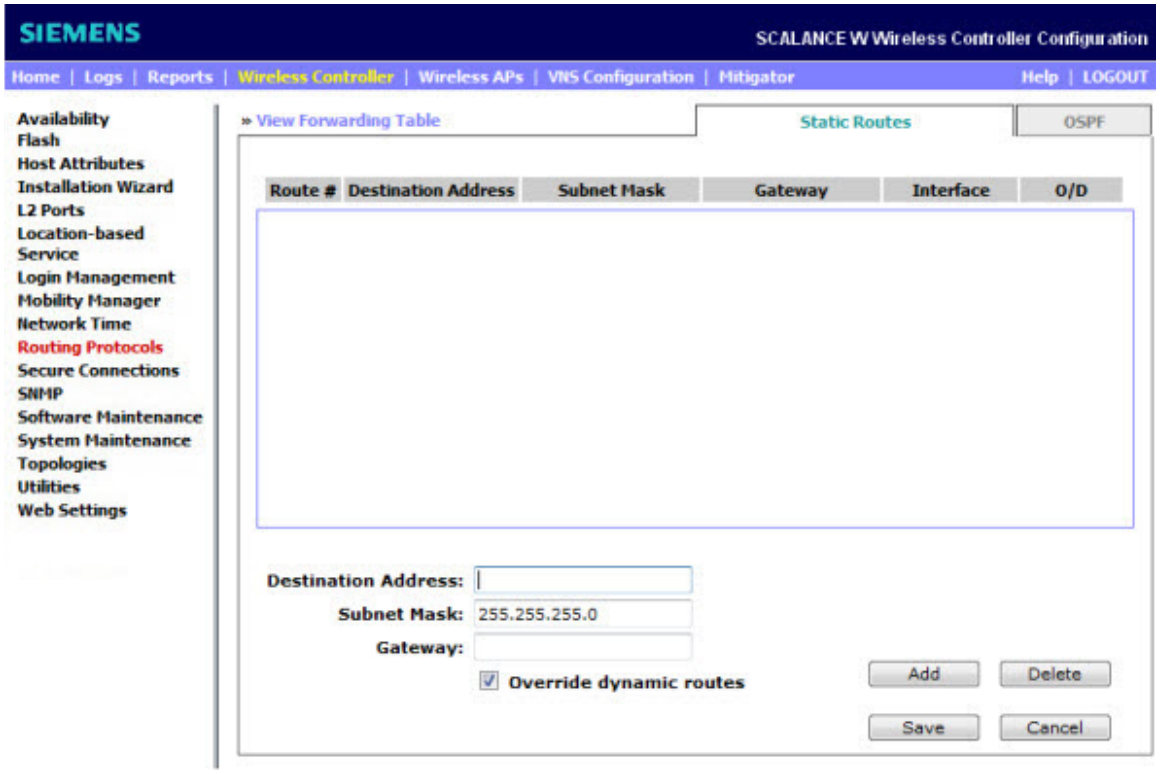
Setting Up Static Routes

When setting up a SCALANCE IWLAN Controller routing protocol, you must define a default route to your enterprise network, either with a static route or by using the OSPF protocol. A default route enables the SCALANCE IWLAN Controller to forward packets to destinations that do not match a more specific route definition.

To Set a Static Route on the SCALANCE IWLAN Controller:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.

2. In the left pane, click **Routing Protocols**. The **Static Routes** tab is displayed.



3. To add a new route, in the **Destination Address** box type the destination IP address of a packet.

   To define a default static route for any unknown address not in the routing table, type **0.0.0.0**.

4. In the **Subnet Mask** box, type the appropriate subnet mask to separate the network portion from the host portion of the IP address (typically 255.255.255.0). To define the default static route for any unknown address, type 0.0.0.0.

5. In the **Gateway** box, type the IP address of the adjacent router port or gateway on the same subnet as the SCALANCE IWLAN Controller to which to forward these packets. This is the IP address of the next hop between the SCALANCE IWLAN Controller and the packet's ultimate destination.

6. Click **Add**. The new route is added to the list of routes.

7. Select the **Override dynamic routes** checkbox to give priority over the OSPF learned routes, including the default route, which the SCALANCE IWLAN Controller uses for routing. This option is enabled by default.

   To remove this priority for static routes, so that routing is controlled dynamically at all times, clear the **Override dynamic routes** checkbox.

Note:
If you enable dynamic routing (OSPF), the dynamic routes will normally have priority for outgoing routing. For internal routing on the SCALANCE IWLAN Controller, the static routes normally have priority.

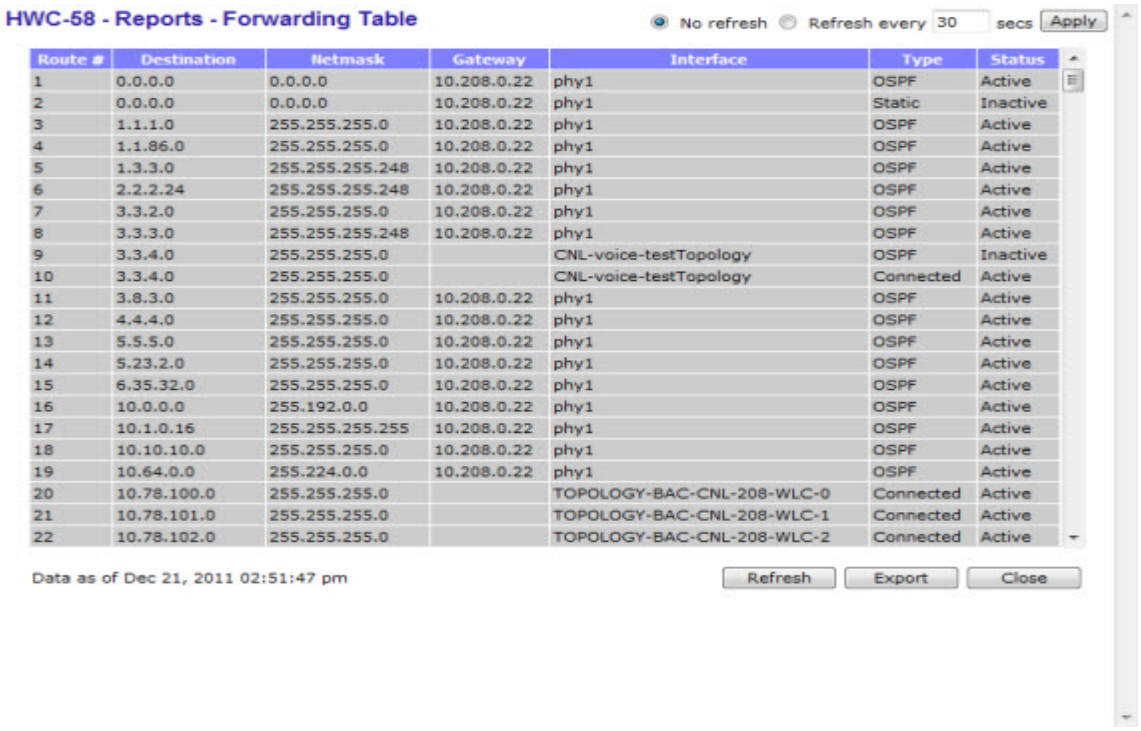
8. To save your changes, click **Save**.

Viewing the Forwarding Table

You can view the defined routes, whether static or OSPF, and their current status in the forwarding table.

To View the Forwarding Table on the SCALANCE IWLAN Controller:

1. From the **Routing Protocols Static Routes** tab, click **View Forwarding Table.** The Forwarding Table is displayed.
2. Alternatively, from the top menu, click **Reports**. The **Available AP Reports** screen is displayed.
3. In the left pane, click **Routing Protocols**, then click **Forwarding Table**. The **Forwarding Table** is displayed.



Route #	Destination	Netmask	Gateway	Interface	Type	Status
1	0.0.0.0	0.0.0.0	10.208.0.22	phy1	OSPF	Active
2	0.0.0.0	0.0.0.0	10.208.0.22	phy1	Static	Inactive
3	1.1.1.0	255.255.255.0	10.208.0.22	phy1	OSPF	Active
4	1.1.86.0	255.255.255.0	10.208.0.22	phy1	OSPF	Active
5	1.3.3.0	255.255.255.248	10.208.0.22	phy1	OSPF	Active
6	2.2.2.24	255.255.255.248	10.208.0.22	phy1	OSPF	Active
7	3.3.2.0	255.255.255.0	10.208.0.22	phy1	OSPF	Active
8	3.3.3.0	255.255.255.248	10.208.0.22	phy1	OSPF	Active
9	3.3.4.0	255.255.255.0		CNL-voice-testTopology	OSPF	Inactive
10	3.3.4.0	255.255.255.0		CNL-voice-testTopology	Connected	Active
11	3.8.3.0	255.255.255.0	10.208.0.22	phy1	OSPF	Active
12	4.4.4.0	255.255.255.0	10.208.0.22	phy1	OSPF	Active
13	5.5.5.0	255.255.255.0	10.208.0.22	phy1	OSPF	Active
14	5.23.2.0	255.255.255.0	10.208.0.22	phy1	OSPF	Active
15	6.35.32.0	255.255.255.0	10.208.0.22	phy1	OSPF	Active
16	10.0.0.0	255.192.0.0	10.208.0.22	phy1	OSPF	Active
17	10.1.0.16	255.255.255.255	10.208.0.22	phy1	OSPF	Active
18	10.10.10.0	255.255.255.0	10.208.0.22	phy1	OSPF	Active
19	10.64.0.0	255.224.0.0	10.208.0.22	phy1	OSPF	Active
20	10.78.100.0	255.255.255.0		TOPOLOGY-BAC-CNL-208-WLC-0	Connected	Active
21	10.78.101.0	255.255.255.0		TOPOLOGY-BAC-CNL-208-WLC-1	Connected	Active
22	10.78.102.0	255.255.255.0		TOPOLOGY-BAC-CNL-208-WLC-2	Connected	Active

This report displays all defined routes, whether static or OSPF, and their current status.

4. To update the display, click **Refresh**.

Setting Up OSPF Routing

To enable OSPF (OSPF RFC2328) routing, you must:

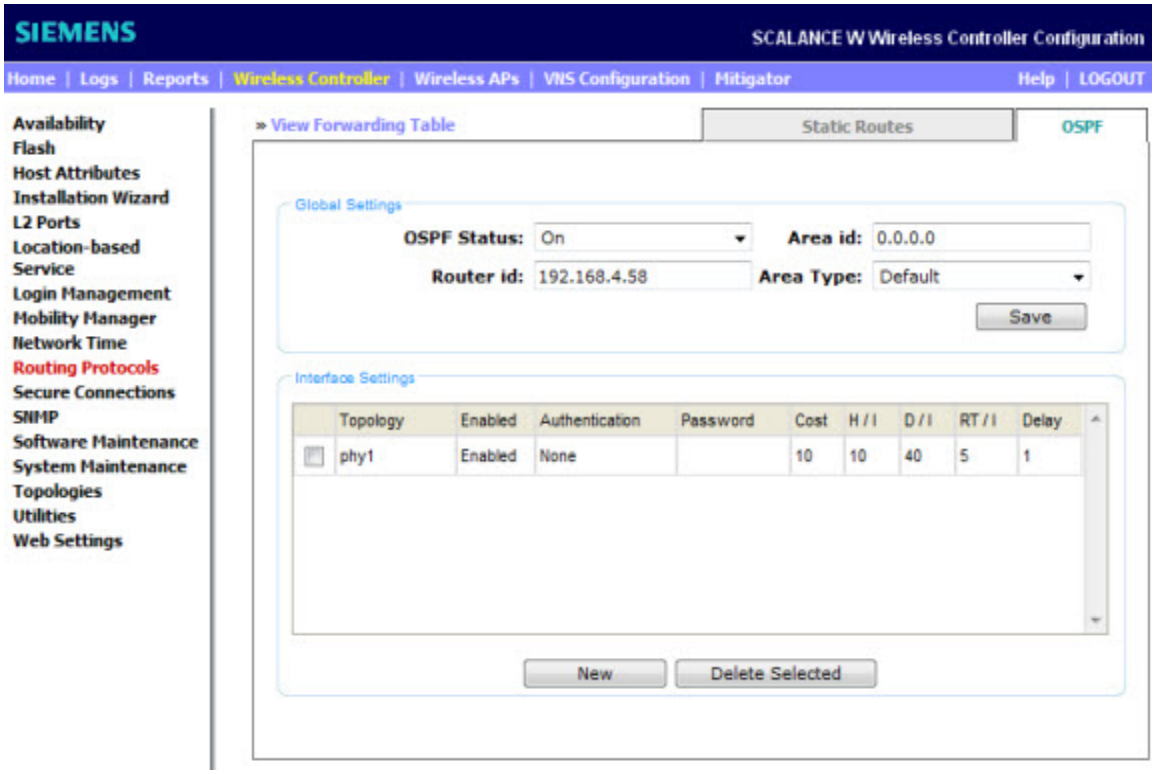
- Specify at least one topology on which OSPF is enabled on the Port Settings option of the OSPF tab. This is the interface on which you can establish OSPF adjacency.
- Enable OSPF globally on the SCALANCE IWLAN Controller.
- Define the global OSPF parameters.

Ensure that the OSPF parameters defined here for the SCALANCE IWLAN Controller are consistent with the adjacent routers in the OSPF area. This consistency includes the following:

- If the peer router has different timer settings, the protocol timer settings in the SCALANCE IWLAN Controller must be changed to match to achieve OSPF adjacency.
- The MTU of the ports on either end of an OSPF link must match. The MTU for ports on the SCALANCE IWLAN Controller is fixed at 1500. This matches the default MTU in standard routers.

To Set OSPF Routing Global Settings on the SCALANCE IWLAN Controller:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **Routing Protocols**. The **Static Routes** tab is displayed by default.
3. Click the **OSPF** tab.



4. From the **OSPF Status** drop-down list, click **On** to enable OSPF.

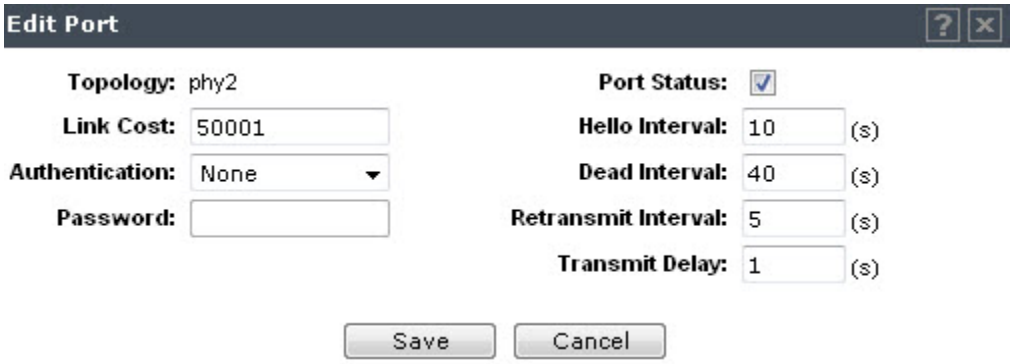
   In the **Router ID** box, type the IP address of the SCALANCE IWLAN Controller. This ID must be unique across the OSPF area. If left blank, the OSPF daemon automatically picks a router ID from one of the SCALANCE IWLAN Controller's interface IP addresses.
5. In the **Area ID** box, type the area. 0.0.0.0 is the main area in OSPF.
6. In the **Area Type** drop-down list, click one of the following:
   - **Default** — The default acts as the backbone area (also known as area zero). It forms the core of an OSPF network. All other areas are connected to it, and inter-area routing happens via a router connected to the backbone area.

- **Stub** — The stub area does not receive external routes. External routes are defined as routes which were distributed in OSPF via another routing protocol. Therefore, stub areas typically rely on a default route to send traffic routes outside the present domain.
- **Not-so-stubby** — The not-so-stubby area is a type of stub area that can import autonomous system (AS) external routes and send them to the default/backbone area, but cannot receive AS external routes from the backbone or other areas.

7. To save your changes, click **Save**.

To Set OSPF Routing Port Settings on the SCALANCE IWLAN Controller:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **Routing Protocols**.
3. Click the **OSPF** tab.
4. Select a port to configure by clicking on the desired port in the Port Settings table. The Edit Port dialog displays.



5. In the **Link Cost** box, type the OSPF standard value for your network for this port. This is the cost of sending a data packet on the interface. The lower the cost, the more likely the interface is to be used to forward data traffic.

Note:
If more than one port is enabled for OSPF, it is important to prevent the SCALANCE IWLAN Controller from serving as a router for other network traffic (other than the traffic from wireless device users on routed topologies controlled by the SCALANCE IWLAN Controller). For more information, see "Filtering Rules" on page 5-3.

6. In the **Authentication** drop-down list, click the authentication type for OSPF on your network: **None** or **Password**. The default setting is **None**.
7. If **Password** is selected as the authentication type, in the **Password** box, type the password.

   If **None** is selected as the Authentication type, leave this box empty. This password must match on either end of the OSPF connection.
8. Type the following:
   - **Hello-Interval —** Specifies the time in seconds (displays OSPF default).The default setting is **10** seconds.
   - **Dead-Interval —** Specifies the time in seconds (displays OSPF default). The default setting is **40** seconds.

- **Retransmit-Interval —** Specifies the time in seconds (displays OSPF default). The default setting is **5** seconds.
- **Transmit Delay—** Specifies the time in seconds (displays OSPF default). The default setting is **1** second.

9. To save your changes, click **Save**.

To Confirm That Ports Are Set for OSPF:

1. To confirm that the ports are set up for OSPF, and that advertised routes from the upstream router are recognized, click **View Forwarding Table**. The **Forwarding Table** is displayed.

   The following additional reports display OSPF information when the protocol is in operation:

   - **OSPF Neighbor** — Displays the current neighbors for OSPF (routers that have interfaces to a common network)
   - **OSPF Linkstate** — Displays the Link State Advertisements (LSAs) received by the currently running OSPF process. The LSAs describe the local state of a router or network, including the state of the router's interfaces and adjacencies.

2. To update the display, click **Refresh**.

Configuring Filtering at the Interface Level

The SCALANCE IWLAN solution has a number of built-in filters that protect the system from unauthorized traffic. These filters are specific only to the SCALANCE IWLAN Controller. These filters are applied at the network interface level and are automatically invoked. By default, these filters provide stringent-level rules to allow only access to the system's externally visible services. In addition to these built-in filters, the administrator can define specific exception filters at the interface-level to customize network access. These filters depend on Topology Modes and the configuration of an L3 interface for the topology.

For Bridged at Controller topologies, exception filters are defined only if L3 (IP) interfaces are specified. For Physical, Routed, and 3rd Party AP topologies, exception filtering is always configured since they all have an L3 interface presence.

Built-in Interface-based Exception Filters

On the SCALANCE IWLAN Controller, various interface-based exception filters are built in and invoked automatically. These filters protect the SCALANCE IWLAN Controller from unauthorized access to system management functions and services via the interfaces. Access to system management functions is granted if the administrator selects the **allow management** traffic option in a specific topology.

Allow management traffic is possible on the topologies that have L3 IP interface definitions. For example, if management traffic is allowed on a physical topology (esa0), only users connected through ESA0 will be able to get access to the system. Users connecting on any other topology, such as Routed or Bridged Locally at Controller, will no longer be able to target ESA0 to gain management access to the system. To allow access for users connected on such a topology, the given topology configuration itself must have **allow management** traffic enabled and users will only be able to target the topology interface specifically.

On the SCALANCE IWLAN Controller's L3 interfaces (associated with either physical, Routed, or Bridged Locally at Controller topologies), the built-in exception filter prohibits invoking SSH, HTTPS, or SNMP. However, such traffic is allowed, by default, on the management port.

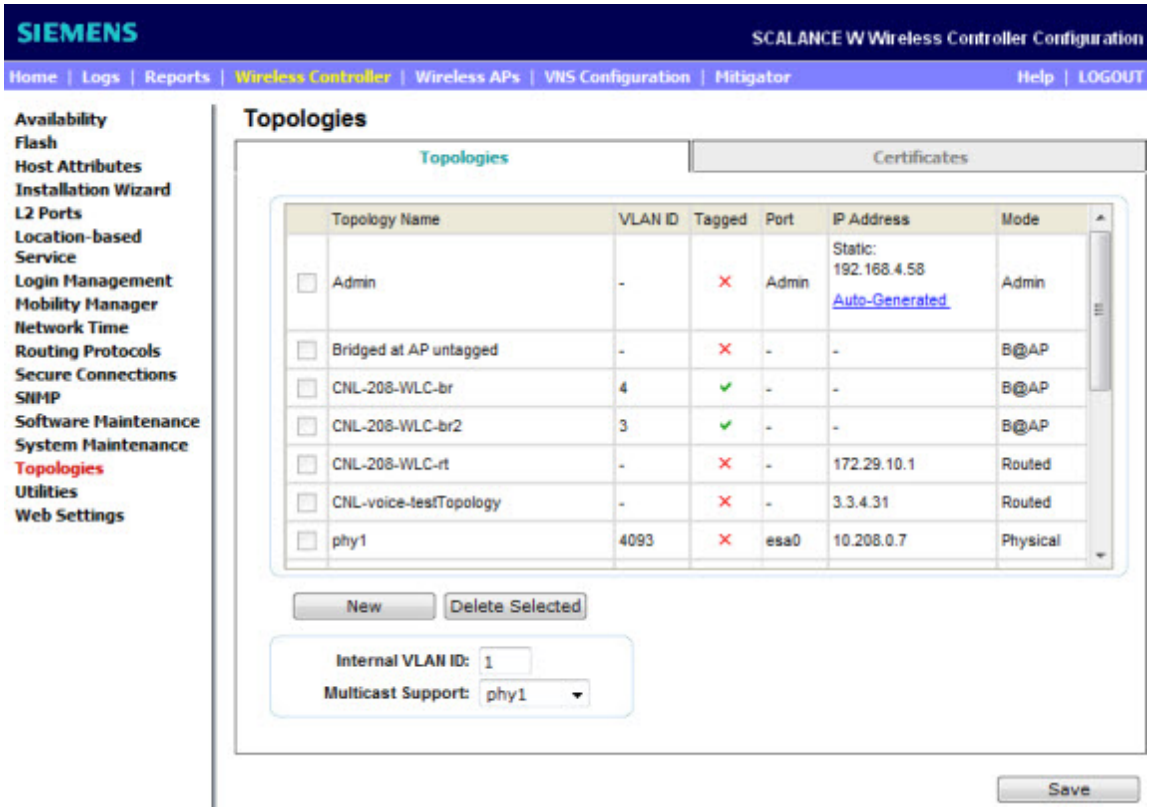
If management traffic is explicitly enabled for any interface, access is implicitly extended to that interface through any of the other interfaces (VNS). Only traffic specifically allowed by the interface's exception filter is allowed to reach the SCALANCE IWLAN Controller itself. All other traffic is dropped. Exception filters are dynamically configured and regenerated whenever the system's interface topology changes (for example, a change of IP address for any interface).

Enabling management traffic on an interface adds additional rules to the exception filter, which opens up the well-known IP(TCP/UDP) ports, corresponding to the HTTPS, SSH, and SNMP applications.

The interface-based built-in exception filtering rules, in the case of traffic from wireless users, are applicable to traffic targeted directly for the topology L3 interface. For example, a filter specified by a Policy may be generic enough to allow traffic access to the SCALANCE IWLAN Controller's management (for example, Allow All [*.*.*.*]). Exception filter rules are evaluated after the user's assigned filter policy, as such, it is possible that the policy allows the access to management functions that the exception filter denies. These packets are dropped.

To Enable SSH, HTTPS, or SNMP Access Through a Physical Data Interface:

1. From the top menu, click **Wireless Controller.** The **Wireless Controller Configuration s**creen is displayed.
2. In the left pane, click **Topologies**. The **Topologies** tab is displayed.



3. On the **Topologies** tab, click the appropriate data port topology. The Edit Topology window displays.
4. Select the **Management Traffic** checkbox if the topology has specified an L3 IP interface presence.
5. To save your changes, click **Save**.

Working with Administrator-defined Interface-based Exception Filters

You can add specific filtering rules at the interface level in addition to the built-in rules. Such rules give you the capability of restricting access to a port, for specific reasons, such as a Denial of Service (DoS) attack.

The filtering rules are set up in the same manner as filtering rules defined for a Policy — specify an IP address, select a protocol if applicable, and then either allow or deny traffic to that address. For more information, see “Filtering Rules” on page 5-3.

The rules defined for port exception filters are prepended to the normal set of restrictive exception filters and have precedence over the system's normal protection enforcement (that is, they are evaluated first).

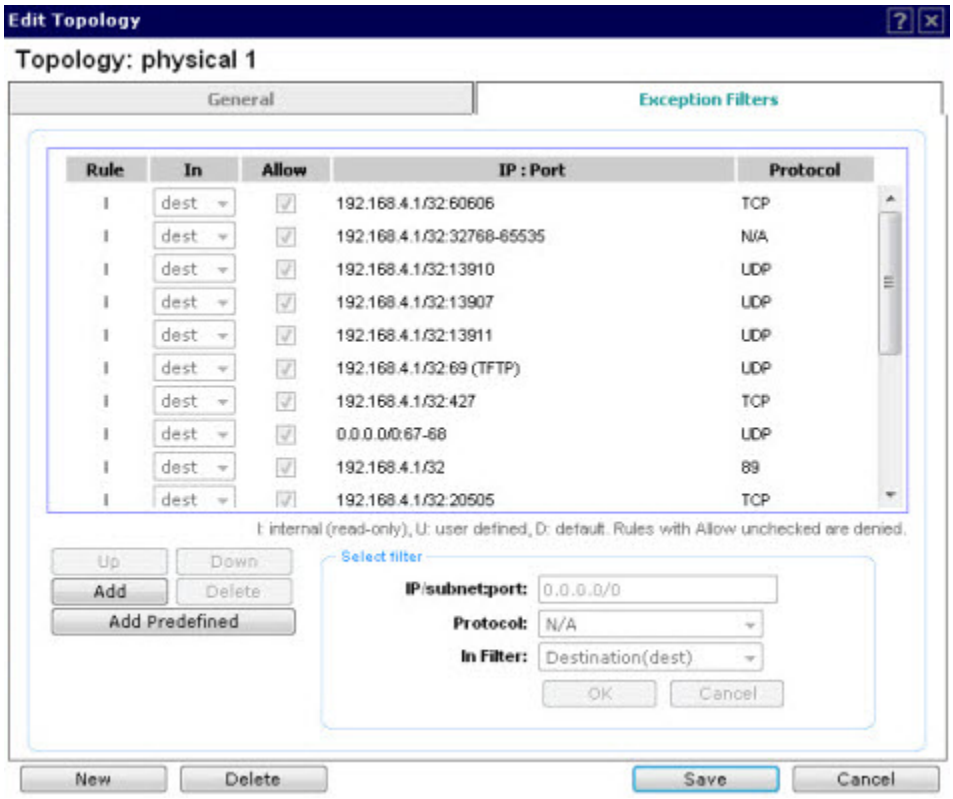
NOTICE

If defined improperly, user exception rules may seriously compromise the system’s normal security enforcement rules. They may also disrupt the system's normal operation and even prevent system functionality altogether. It is advised to only augment the exception-filtering mechanism if absolutely necessary.

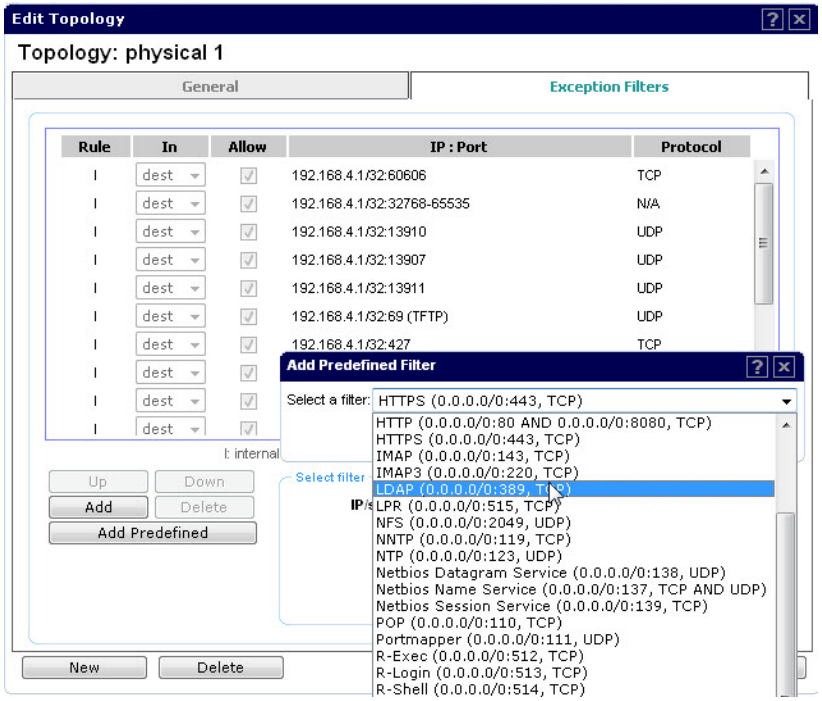
To Define Interface Exception Filters:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **Topologies**. The **Topologies** screen is displayed.
3. Select a topology to be configured. The Edit Topology window is displayed.

4. If the topology has an L3 interface defined, an Exception Filters tab is available. Select this tab. The Exception Filter rules are displayed.



5. Add rules by either:
   – Clicking the **Add Predefined** button, selecting a filter from the drop down list, and clicking **Add**.



   – Clicking the Add button, filling in the following fields, then clicking **OK**:
     (1) In the **IP / subnet:port** box, type the destination IP address. You can also specify an IP range, a port designation, or a port range on that IP address.
     (2) In the **Protocol** drop-down list, click the protocol you want to specify for the filter. This list may include **UDP**, **TCP**, **GRE**, **IPsec-ESP**, **IPsec-AH**, **ICMP**. The default is N/A.
6. The new filter is displayed in the upper section of the screen.
7. Click the new filter entry.
8. To allow traffic, select the **Allow** checkbox.
9. To adjust the order of the filtering rules, click **Up** or **Down** to position the rule. The filtering rules are executed in the order defined here.
10. To save your changes, click **Save**.

Protecting the Controller's Interfaces and Internal Captive Portal Page

By default, the SCALANCE IWLAN Controller is shipped with a self-signed certificate used to perform the following tasks:

- Protect all interfaces that provide administrative access to the SCALANCE IWLAN Controller
- Protect the internal Captive Portal page

This certificate is associated with topologies that have a configured L3 (IP) interface.

If you continue to use the default certificate to secure the SCALANCE IWLAN Controller and internal Captive Portal page, your Web browser will likely produce security warnings regarding the security risks of trusting self-signed certificates. To avoid the certificate-related Web browser security warnings, you can install customized certificates on the SCALANCE IWLAN Controller.

Note:
To avoid the certificate-related Web browser security warnings when accessing the SCALANCE W Wireless Assistant, you must also import the customized certificates into your Web browser application.

Before Installing a Certificate

Before you create and install a certificate:

1. Select a certificate format to install. The SCALANCE IWLAN Controller supports several types of certificates, as shown in Table 2-2.

Table 2-2 Supported Certificate and CA Formats

Certificate Format	Description
PKCS#12	The PKCS#12 certificate (.pfx) file contains both a certificate and the corresponding private key. The SCALANCE IWLAN Controller will accept the PKCS#12 file as long as the format of the private key and certificate are valid.
PEM/DER	The PEM/DER certificate (.crt) file requires a separate PEM/DER private key (.key) file. The SCALANCE IWLAN Controller uses OpenSSL PKCS12 command to convert the .crt and .key files into a single .pfx PKCS#12 certificate file. The SCALANCE IWLAN Controller will accept the PEM/DER file as long as the format of the private key and certificate are valid.
PEM-formatted CA public certificate file	If you choose to install this optional certificate, you must do so when specifying the PCKCS#12 or PEM/DER certificates.

Note:
When generating the PKCS#12 certificate file or PEM/DER certificate and key files, you must ensure that the interface identified in the certificate corresponds to the SCALANCE IWLAN Controller's interface for which the certificate is being installed.

2. Understand how the controller monitors the expiration date of installed certificates.

   The SCALANCE IWLAN Controller generates an entry in the events information log as the certificate expiry date approaches, based on the following schedule: 15, 8, 4, 2, and 1 day prior to expiration. The log messages cease when the certificate expires. For more information, see the SCALANCE WLC711 *Maintenance Guide.*

3. Understand how the controller manages certificates during upgrades and migrations.

   Installed certificates will be backed up and restored with the SCALANCE IWLAN Controller configuration data. Installed certificates will also be migrated during an upgrade and during a migration.

Installing a Certificate for a SCALANCE IWLAN Controller Interface

You can install a certificate from the Certificates tab available on the Topologies page.

To Install a Certificate for a SCALANCE IWLAN Controller Data Interface:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **Topologies**. The **Topologies** tab is displayed.
3. Click the **Certificates** tab.
4. In the **Interface Certificates** table, click to select the topology (which has an L3 interface) for which you want to install a certificate.

Note:
There are separate certificates for the Admin for IPv4 and IPv6.

The Configuration for Topologies section and the Generate Signing Request button become available. Use the field and button descriptions in Table 2-3 to create and install certificates.

Note:
The interface identified in the certificate must correspond to the SCALANCE IWLAN Controller's interface for which the certificate is being installed.

The **Configuration for Topologies** section displays.

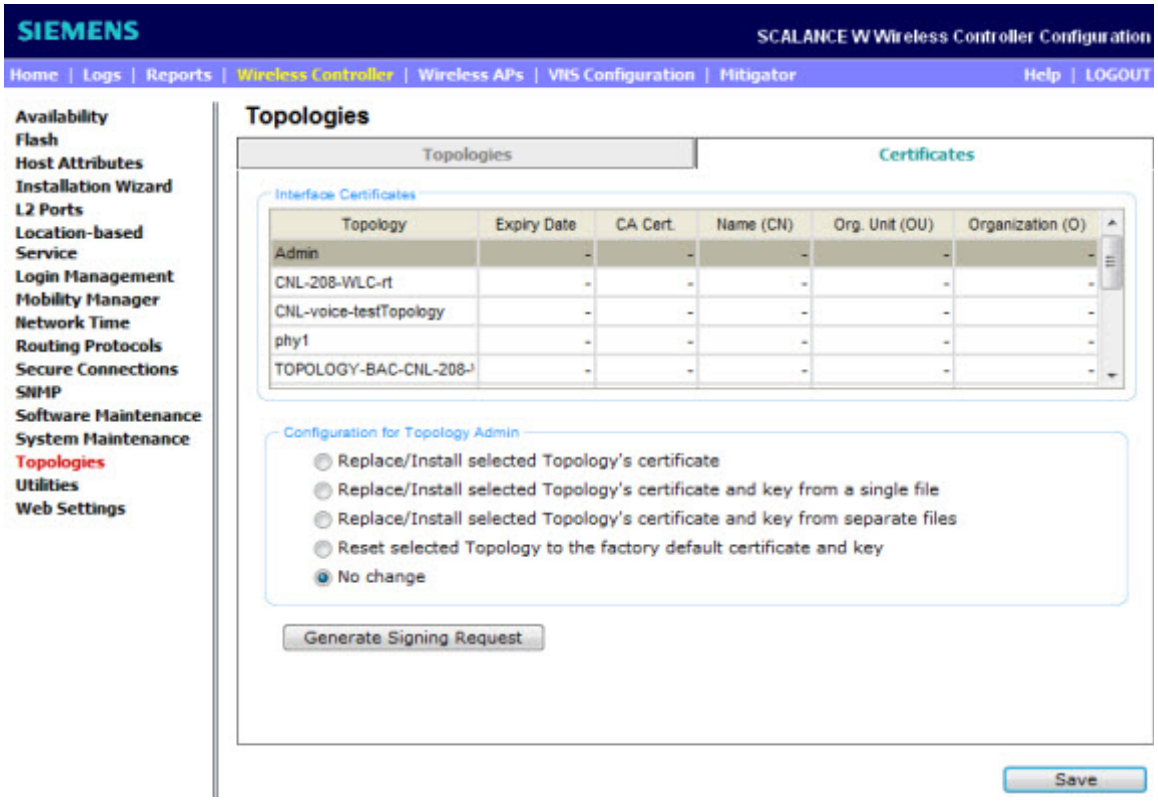


Table 2-3 Topologies Page: Certificates Tab Fields and Buttons

Field/Button	Description
Interface Certificates	
Topology	Topology name
Expiry Date	Date when the certificate expires
CA Cert.	Identifies whether or not a CA certificate has been installed on the topology.
Name (CN)	**Note:** The IP address of DNS address associated with the topology that the certificate applies to. The Name field supports both IPv4 or IPv6 addresses.
Org Unit (OU)	Name of the organization's unit.
Organization	Name of the organization
Configuration for Topology	
Replace/Install selected Topology's certificate	To replace the existing port's certificate and key using this option, do the following: 1. From the click the Generate Signing Request button to create the certificate and key. 2. Download the key and CSR when prompted. 3. Use a 3rd party certificate service to sign the CSR and create a certificate and a Certificate Authority (CA) file. 4. Save the certificate on your computer. 5. Return to the Certificates tab on the SCALANCE W Wireless Assistant UI. 6. Select the topology for which you created the certificate and select **Replace/Install selected Topologies certificate.** 7. Click **Browse** next to the **Signed certificate to install** box. 8. Navigate to the certificate file you want to install for this port, and then click **Open**. The certificate file name is displayed in the **Certificate file to install** box. 9. (Optional) Click **Browse** next to the **Optional:Enter PEM-encoded CA public certificates file** box. The **Choose file** dialog is displayed. 10. (Optional) Navigate to the certificate file you want to install for this port, and then click **Open**. The certificate file name is displayed in the **Optional:Enter PEM-encoded CA public certificates file** box. **Note:** If you choose to install a CA public certificate, you must install it when you install the PEM/DER certificate and key.

Table 2-3 Topologies Page: Certificates Tab Fields and Buttons (continued)

Field/Button	Description
Replace/Install selected Topology's certificate and key from a single file	To replace the existing port's certificate and key using this option, do the following: 1. Click **Browse** next to the **PKCS #12 file to install** box. The **Choose file** dialog is displayed. 2. Navigate to the certificate file you want to install for this port, and then click **Open**. The certificate file name is displayed in the **PKCS #12 file to install** box. 3. In the **Private key password** box, type the password for the key file. The key file is password protected. 4. (Optional) Click **Browse** next to the **Optional:Enter PEM-encoded CA public certificates file** box. The **Choose file** dialog is displayed. 5. (Optional) Navigate to the certificate file you want to install for this port, and then click **Open**. The certificate file name is displayed in the **Optional:Enter PEM-encoded CA public certificates file** box. **Note:** If you choose to install a CA public certificate, you must install it when you install the PEM/DER certificate and key.
Replace/Install selected Topology's certificate and key from separate files	To replace the existing port's certificate and key using this option, do the following: 1. Click **Browse** next to the **PKCS #12 file to install** box. The **Choose file** dialog is displayed. 2. Navigate to the certificate file you want to install for this port, and then click **Open**. The certificate file name is displayed in the **PKCS #12 file to install** box. 3. Click **Browse** next to the **Private key file to install** box. The **Choose file** dialog is displayed. 4. Navigate to the key file you want to install for this port, and then click **Open**. The key file name is displayed in the **Private key file to install** box 5. In the **Private key password** box, type the password for the key file. The key file is password protected. 6. (Optional) Click **Browse** next to the **Optional:Enter PEM-encoded CA public certificates file** box. The **Choose file** dialog is displayed. 7. (Optional) Navigate to the certificate file you want to install for this port, and then click **Open**. The certificate file name is displayed in the **Optional:Enter PEM-encoded CA public certificates file** box. **Note:** If you choose to install a CA public certificate, you must install it when you install the PEM/DER certificate and key.
Reset selected Topology to the factory default certificate and key	Select to assign the factory default certificate and key to the interface.
No change	The default setting.

Table 2-3 Topologies Page: Certificates Tab Fields and Buttons (continued)

Field/Button	Description
Generate Signing Request	To generate a CSR for the controller, click **Generate Signing Request**. The **Generate Certificate Signing Request** window displays (Figure 2-3)
Save	Click to save the changes to this Topology.

Note:
To avoid the certificate-related Web browser security warnings when accessing the SCALANCE W Wireless Assistant, you must also import the customized certificates into your Web browser application.

Figure 2-3 Generate Certificate Signing Request Window

Table 2-4 Generate Certificate Signing Request Page - Fields and Buttons

Field/Button	Description
Country name	The two-letter ISO abbreviation of the name of the country
State or Province name	The name of the State/Province
Locality name (city)	The name of the city.
Organization name	The name of the organization
Organizational Unit name	The name of the unit within the organization.
Common Name	Set the common name to be one of the following: the IP address of the interface that the CSR applies to. a DNS address associated with the IP address of the interface that the CSR applies to.
Email address	The email address of the organization
Generate Signing Request	Click to generate a signing request. A certificate request file is generated (.csr file extension). The name of the file is the IP address of the topology you created the CSR for. The **File Download** dialog is displayed.

Configuring the Login Authentication Mode

You can configure the following login authentication modes to authenticate administrator login attempts:

- Local authentication — The SCALANCE IWLAN Controller uses locally configured login credentials and passwords. See "Configuring the Local Login Authentication Mode and Adding New Users" on page 2-36.
- RADIUS authentication — The SCALANCE IWLAN Controller uses login credentials and passwords configured on a RADIUS server. See "Configuring the RADIUS Login Authentication Mode" on page 2-38.
- Local authentication first, then RADIUS authentication — The SCALANCE IWLAN Controller first uses locally configured login credentials and passwords. If this login fails, the SCALANCE IWLAN Controller attempts to validate login credentials and passwords configured on a RADIUS server. See "Configuring the Local, RADIUS Login Authentication Mode" on page 2-43.
- RADIUS authentication first, then local authentication — The SCALANCE IWLAN Controller first uses login credentials and passwords configured on a RADIUS server. If this login fails, the SCALANCE IWLAN Controller attempts to validate login credentials and passwords configured locally. See "Configuring the RADIUS, Local Login Authentication Mode" on page 2-44.

Note:
The SCALANCE WLC711 enables you to recover the SCALANCE IWLAN Controller via the **Rescue** mode if you have lost its login password. For more information, see the SCALANCE WLC711 *Maintenance Guide*.

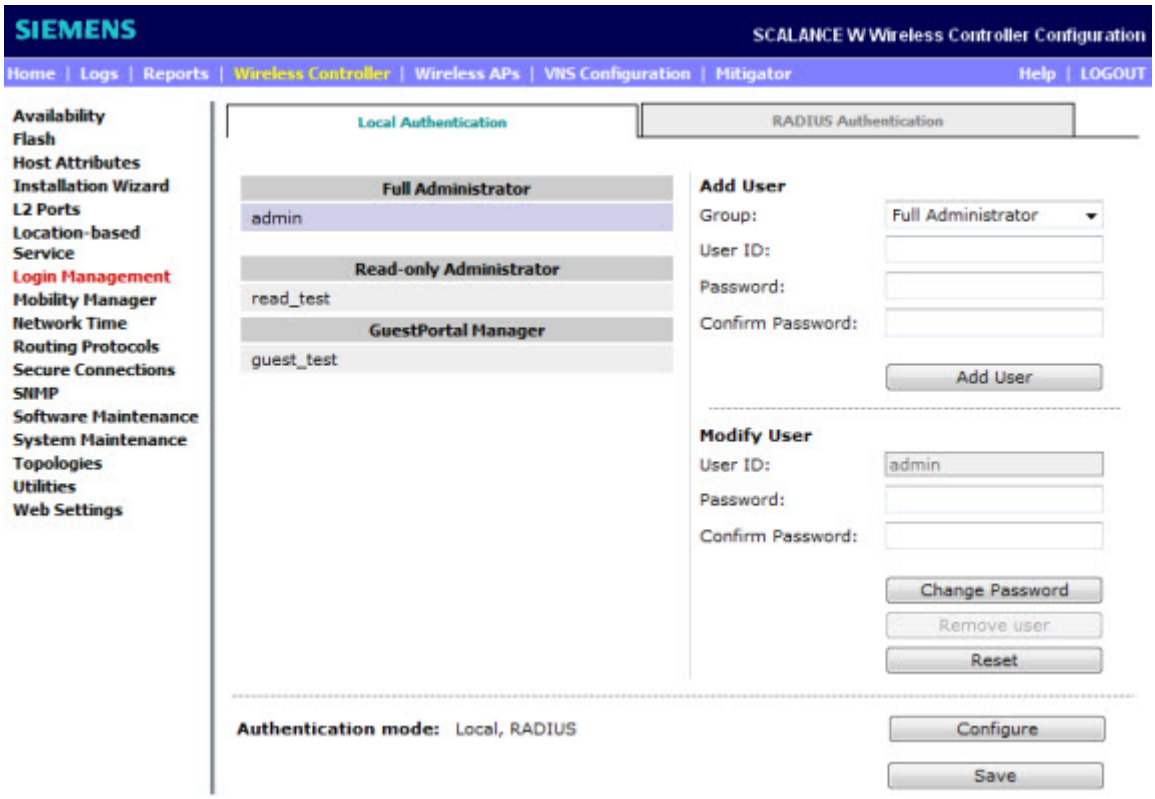
Configuring the Local Login Authentication Mode and Adding New Users

Local login authentication mode is enabled by default. If the login authentication was previously set to another authentication mode, you can change it to the local authentication. You can also add new users and assign them to a login group — as full administrators, read-only administrators, or as a GuestPortal managers. For more information, see "Defining SCALANCE W Wireless Assistant Administrators and Login Groups" on page 17-5.

To configure the local login authentication mode:

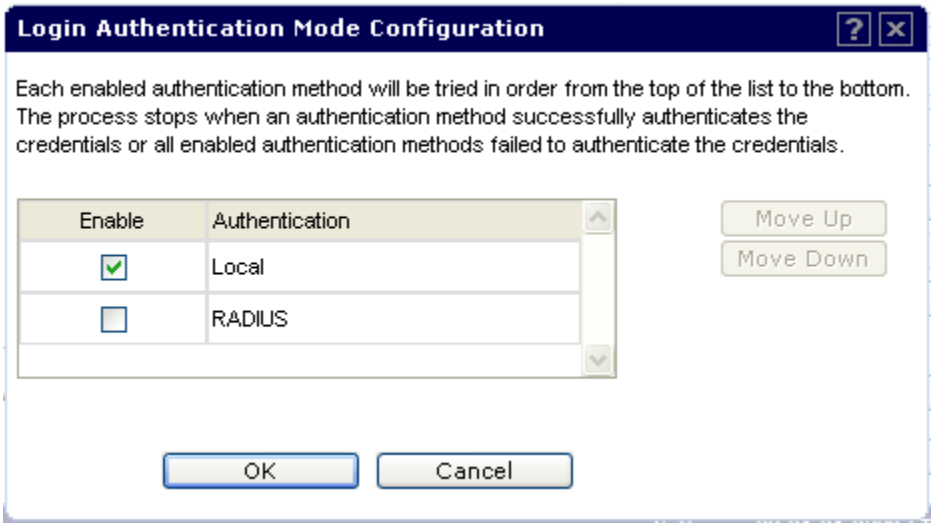
1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.

2. In the left pane, click **Login Management**. The **Login Management** screen is displayed.



3. In the **Authentication mode** section, click **Configure**.

   The **Login Authentication Mode Configuration** window is displayed.


Login Authentication Mode Configuration
Each enabled authentication method will be tried in order from the top of the list to the bottom. The process stops when an authentication method successfully authenticates the credentials or all enabled authentication methods failed to authenticate the credentials.
Enable
Authentication
Local
RADIUS
Move Up
Move Down
OK
Cancel

4. Select the **Local** checkbox.

   If the **RADIUS** checkbox is selected, deselect it.

5. Click **OK**.

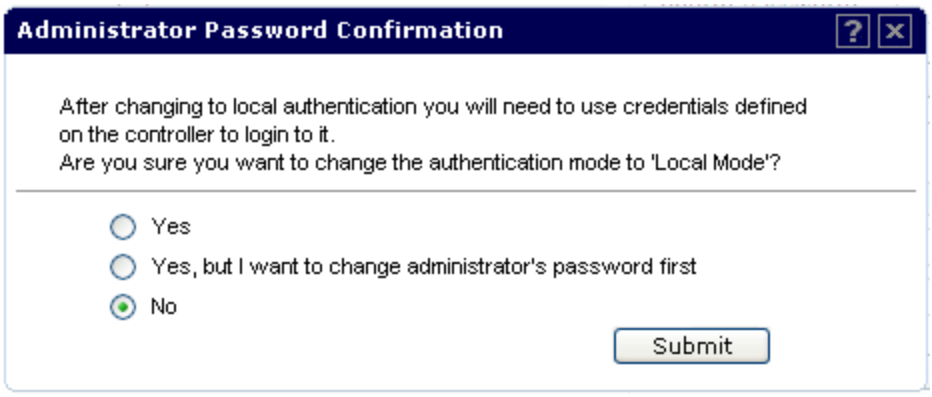
6. In the **Add User** section, select one of the following from the **Group** drop-down list:
   - **Full Administrator** — Grants the administrator's access rights to the administrator.
   - **Read-only Administrator** — Grants read-only access right to the administrator.
   - **GuestPortal Manager** — Grants the user GuestPortal manager rights.
7. In the **User ID** box, type the user's ID.
8. In the **Password** box, type the user's password.

Notes:
UNICODE characters are not supported in passwords for local and remote RADIUS/TACACS+ authentication.

The password must be 8 to 24 characters long.

9. In the **Confirm Password** box, re-type the password.
10. To add the user, click **Add User**. The new user is added.
11. Click **Save**.

    The **Administrator Password Confirmation** window is displayed.


Administrator Password Confirmation
After changing to local authentication you will need to use credentials defined on the controller to login to it.
Are you sure you want to change the authentication mode to 'Local Mode'?
Yes
Yes, but I want to change administrator's password first
No
Submit

12. Select the appropriate option.
    - **Yes** — Change authentication mode to local. Use the administrator password currently defined on the controller.
    - **Yes, but I want to change administrator's password first** — Change authentication mode to local and change the administrator password currently defined on the controller.
    - **No** — Do not change the authentication mode to local.
13. Click **Submit**.
14. If you chose **Yes, but I want to change administrator's password first**, you are prompted to change the administrator's password.

Configuring the RADIUS Login Authentication Mode

The local login authentication mode is enabled by default. You can change the local login authentication mode to RADIUS-based authentication.

Note:
Before you change the default local login authentication to RADIUS-based authentication, you must configure the RADIUS Server on the **Global Settings** screen. For more information, see "VNS Global Settings" on

page 7-3.

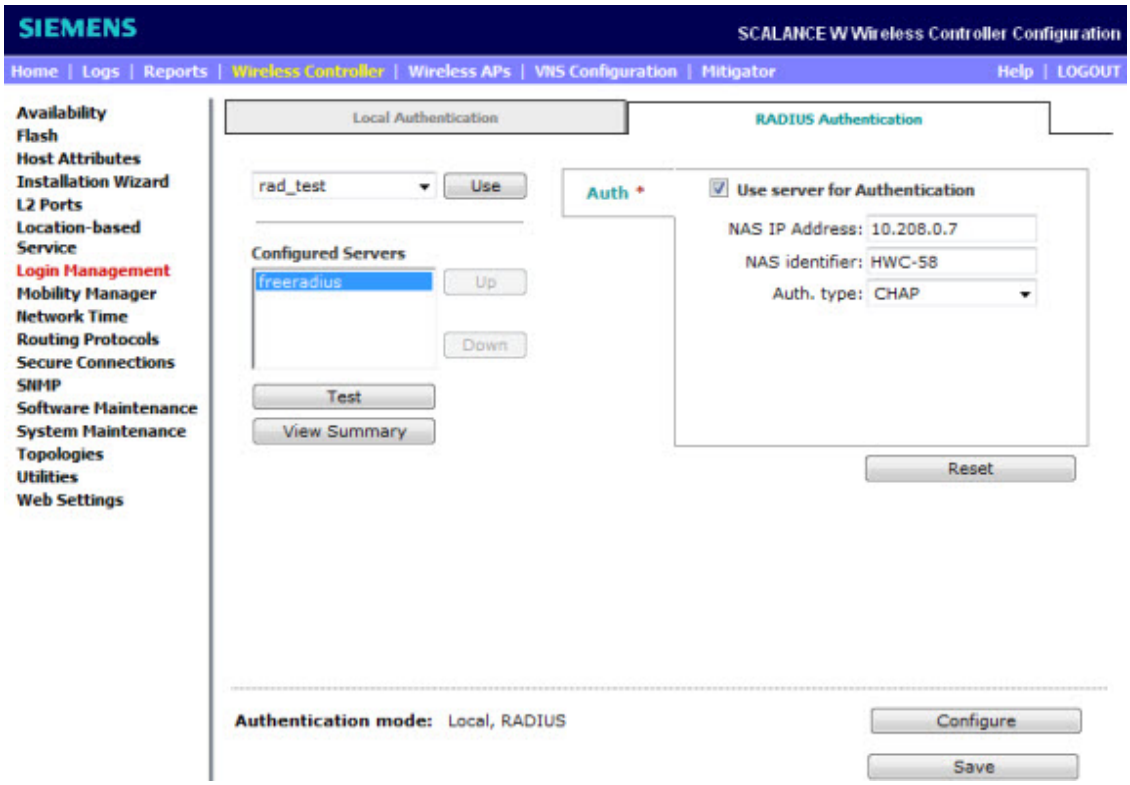
RADIUS is a client/server authentication and authorization access protocol used by a network access server (NAS) to authenticate users attempting to connect to a network device. The NAS functions as a client, passing user information to one or more RADIUS servers. The NAS permits or denies network access to a user based on the response it receives from one or more RADIUS servers. RADIUS uses User Datagram Protocol (UDP) for sending the packets between the RADIUS client and server.

You can configure a RADIUS key on the client and server. If you configure a key on the client, it must be the same as the one configured on the RADIUS servers. The RADIUS clients and servers use the key to encrypt all RADIUS packets transmitted. If you do not configure a RADIUS key, packets are not encrypted. The key itself is never transmitted over the network.

Note:
Before you configure the system to use RADIUS-based login authentication, you must configure the Service-Type RADIUS attribute on the RADIUS server.

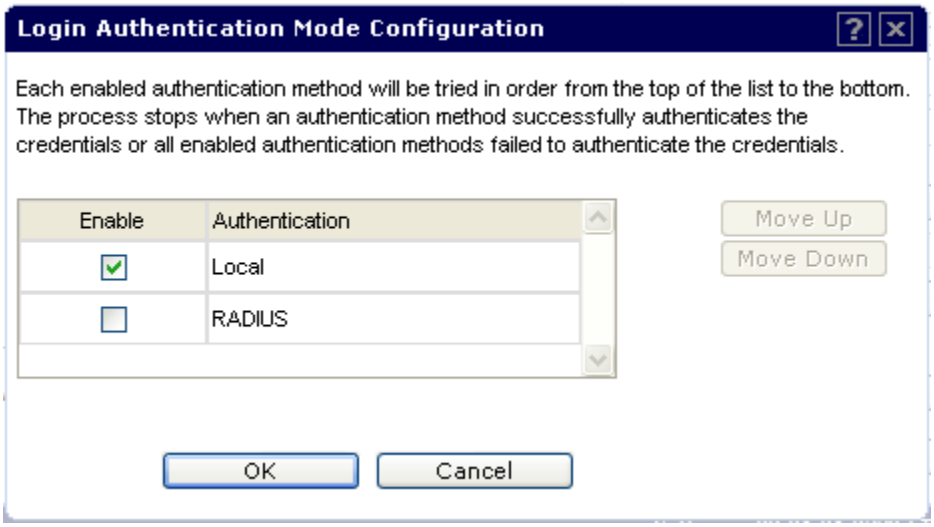
To configure the RADIUS login authentication mode:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **Login Management**. The **Login Management** screen is displayed.
3. Click the **RADIUS Authentication** tab.



4. In the **Authentication mode** section, click **Configure**.

   The **Login Authentication Mode Configuration** window is displayed.


Login Authentication Mode Configuration
Each enabled authentication method will be tried in order from the top of the list to the bottom. The process stops when an authentication method successfully authenticates the credentials or all enabled authentication methods failed to authenticate the credentials.
Enable
Authentication
Local
RADIUS
Move Up
Move Down
OK
Cancel

5. Select the **RADIUS** checkbox.

   If the **Local** checkbox is selected, deselect it.

6. Click **OK**.

7. From the drop-down list, located next to the **Use** button, select the RADIUS Server that you want to use for the RADIUS login authentication, and then click **Use**. The RADIUS Server's name is displayed in the **Configured Servers** box, and in the **Auth** section, and the following default values of the RADIUS Server are displayed.

Note:
The RADIUS Servers displayed in the list located against the **Use** button are defined on **Global Settings** screen. For more information, see "VNS Global Settings" on page 7-3.

   The following values can be edited:

   – **NAS IP address** — The IP address of Network Access Server (NAS).

   – **NAS Identifier** — The Network Access Server (NAS) identifier. The NAS identifier is a RADIUS attribute that identifies the server responsible for passing information to designated RADIUS servers, and then acting on the response returned.

   – **Auth Type** — The authentication protocol type (PAP, CHAP, MS-CHAP, or MS-CHAP2).

   – **Set as Primary Server** — Specifies the primary RADIUS server when there are multiple RADIUS servers.

8. To add additional RADIUS servers, repeat Step 7.

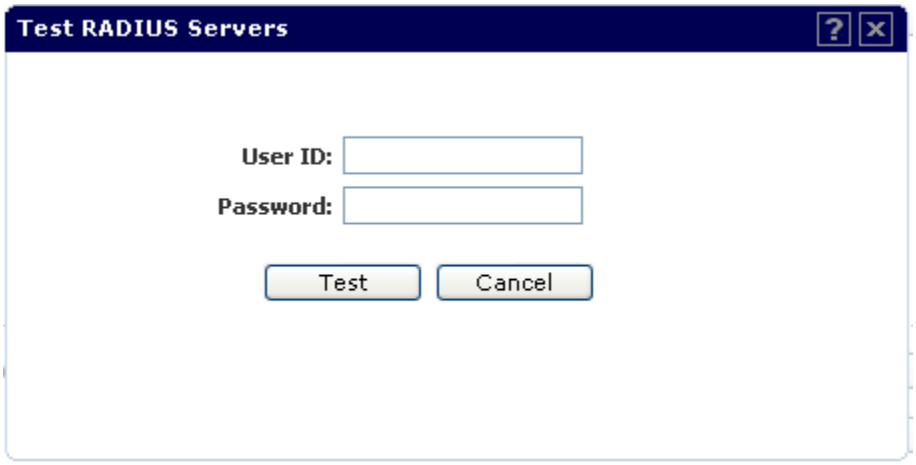
Note:
You can add up to three RADIUS servers to the list of login authentication servers. When you add two or more RADIUS servers to the list, you must designate one of them as the Primary server. The SCALANCE IWLAN Controller first attempts to connect to the Primary server. If the Primary Server is not available, it tries to connect to the second and third server according to their order in the **Configured Servers** box. You can change the order of RADIUS servers in the **Configured Servers** box by clicking on the **Up** and **Down** buttons.

9. Click **Test** to test connectivity to the RADIUS server.

Note:
You can also test the connectivity to the RADIUS server after you save the configuration.

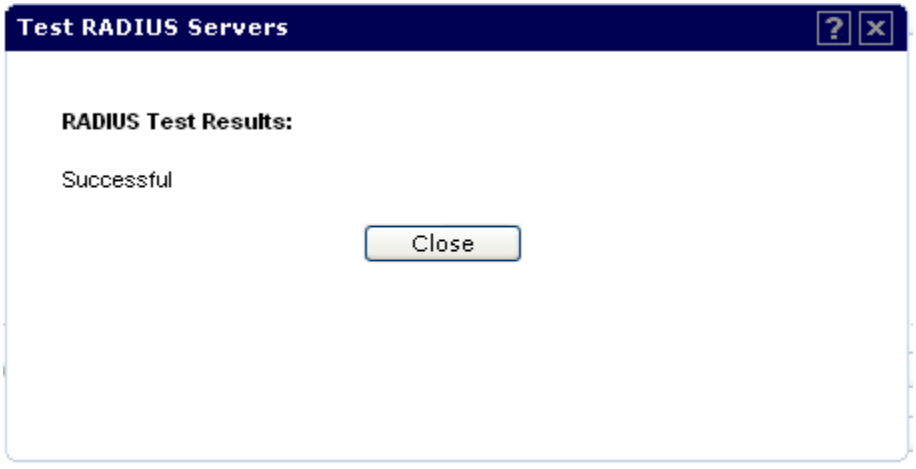
If you do not test the RADIUS server connectivity, and you have made an error in configuring the RADIUS-based login authentication mode, you will be locked out of the SCALANCE IWLAN Controller when you switch the login mode to the RADIUS login authentication mode. If you are locked out, access Rescue mode via the console port to reset the authentication method to local.

The following window is displayed.



10. In the **User ID** and the **Password** boxes, type the user's ID and the password, which were configured on the RADIUS Server, and then click **Test**. The RADIUS connectivity result is displayed.

Note:
To learn how to configure the User ID and the Password on the RADIUS server, refer to your RADIUS server's user guide.

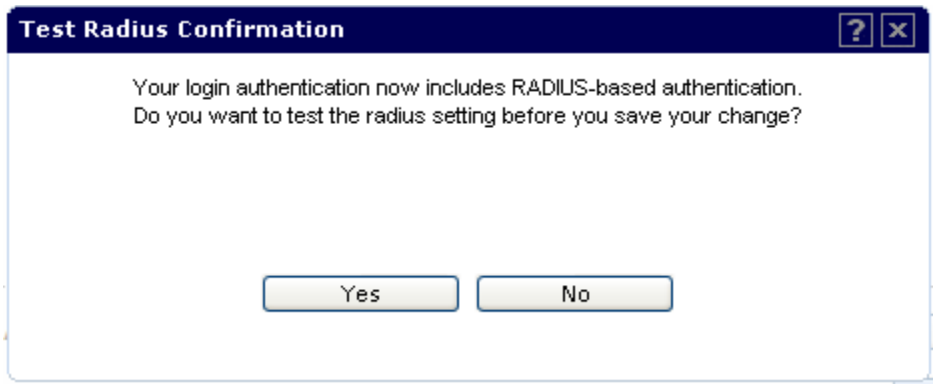


If the test is not successful, the following message will be displayed:

Test RADIUS Servers
RADIUS Test Results:
An authentication service has maintained a retry count which has been reached. No further retries should be attempted
Close

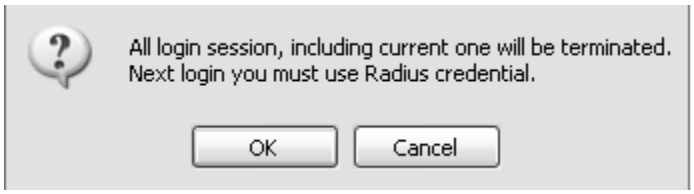
11. If the RADIUS connectivity test displays "Successful" result, click **Save** on the **RADIUS Authentication** screen to save your configuration.

    The following window is displayed:


Test Radius Confirmation
Your login authentication now includes RADIUS-based authentication.
Do you want to test the radius setting before you save your change?
Yes
No

12. If you tested the RADIUS server connectivity earlier in this procedure (Step 9 and Step 10), click **No**. If you click **Yes**, you will be asked to enter the RADIUS server user ID and password. See Step 10 for more information.

    The following message is displayed:



13. To change the authentication mode to RADIUS authentication, click **OK**.

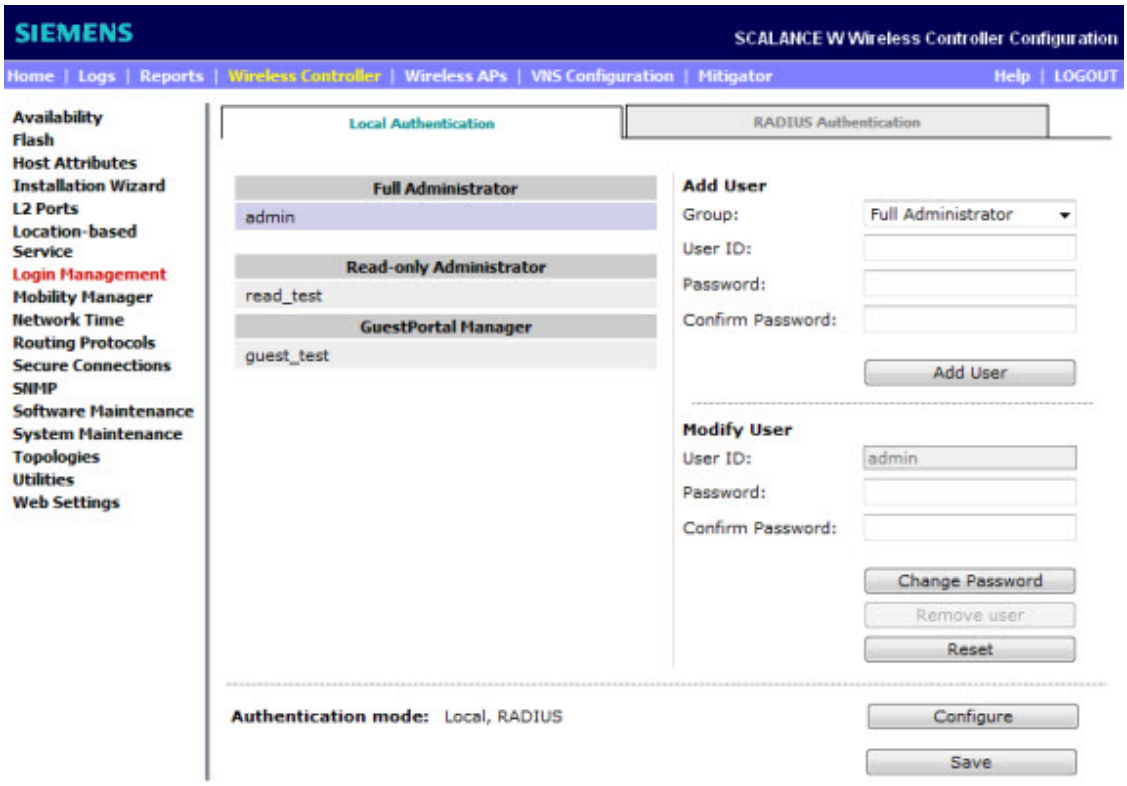
    You will be logged out of the SCALANCE IWLAN Controller immediately. You must use the RADIUS login user name and password to log on the SCALANCE IWLAN Controller.

    To cancel the authentication mode changes, click **Cancel**.

Configuring the Local, RADIUS Login Authentication Mode

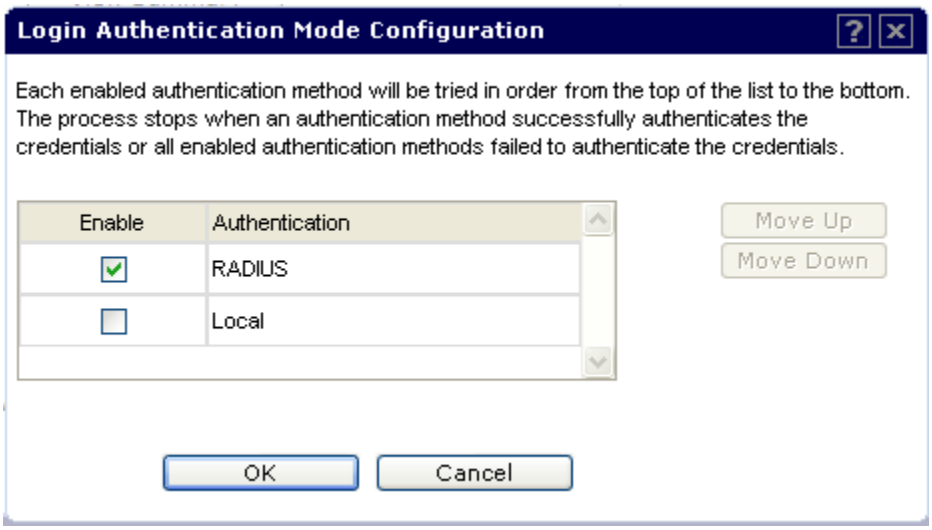
To configure the Local, RADIUS login authentication mode:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **Login Management**. The **Login Management** screen is displayed.

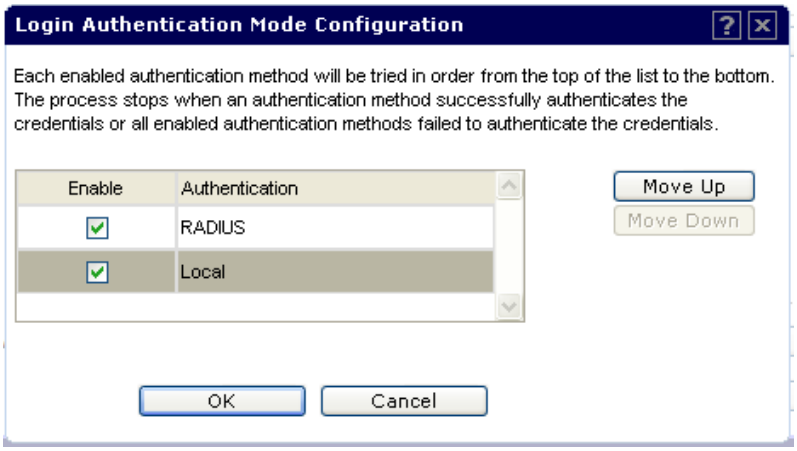


3. In the **Authentication mode** section, click **Configure**.

   The **Login Authentication Mode Configuration** window is displayed.


Login Authentication Mode Configuration
Each enabled authentication method will be tried in order from the top of the list to the bottom. The process stops when an authentication method successfully authenticates the credentials or all enabled authentication methods failed to authenticate the credentials.
Enable
Authentication
RADIUS
Local
Move Up
Move Down
OK
Cancel

4. Select the **Local** and **RADIUS** checkbox.
5. If necessary, select **Local** and use the **Move Up** button to move **Local** to the top of the list.


Login Authentication Mode Configuration
Each enabled authentication method will be tried in order from the top of the list to the bottom. The process stops when an authentication method successfully authenticates the credentials or all enabled authentication methods failed to authenticate the credentials.
Enable
Authentication
RADIUS
Local
Move Up
Move Down
OK
Cancel

6. Click **OK**.
7. On the **Login Management** screen, click **Save**.

For information on setting local login authentication settings, see "Configuring the Local Login Authentication Mode and Adding New Users" on page 2-36.

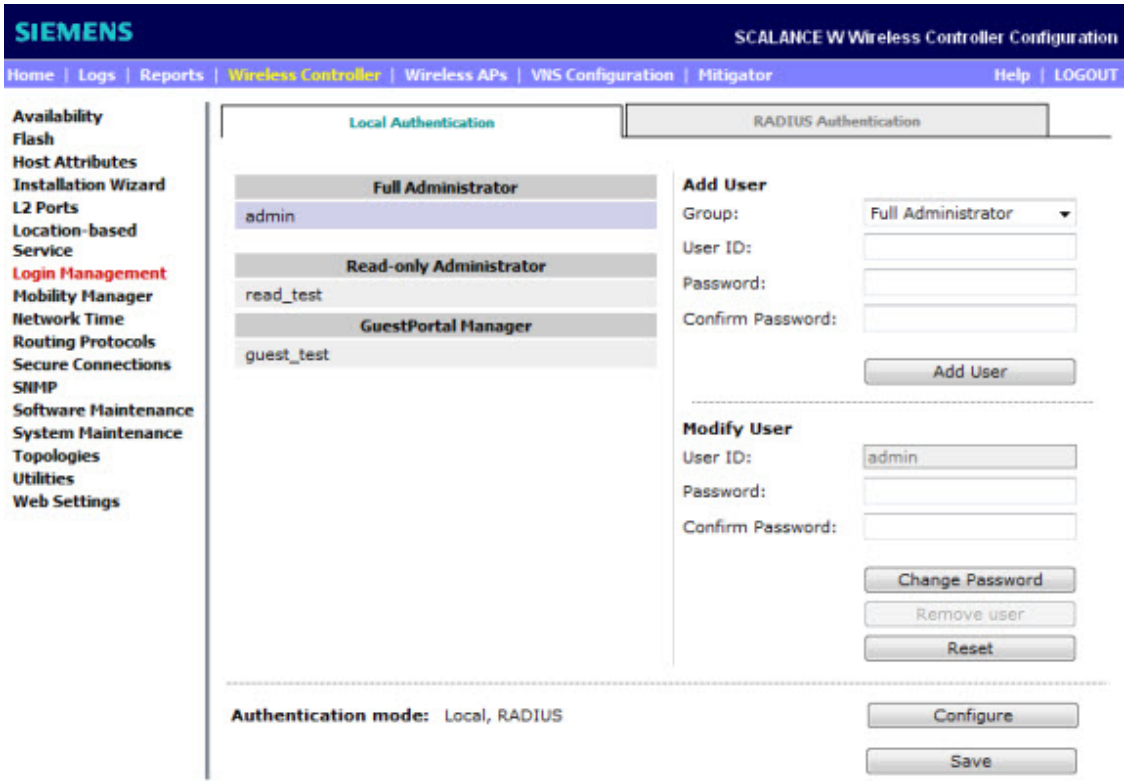
For information on setting RADIUS login authentication settings, see "Configuring the RADIUS Login Authentication Mode" on page 2-38.

Configuring the RADIUS, Local Login Authentication Mode

To configure the RADIUS, Local login authentication mode:

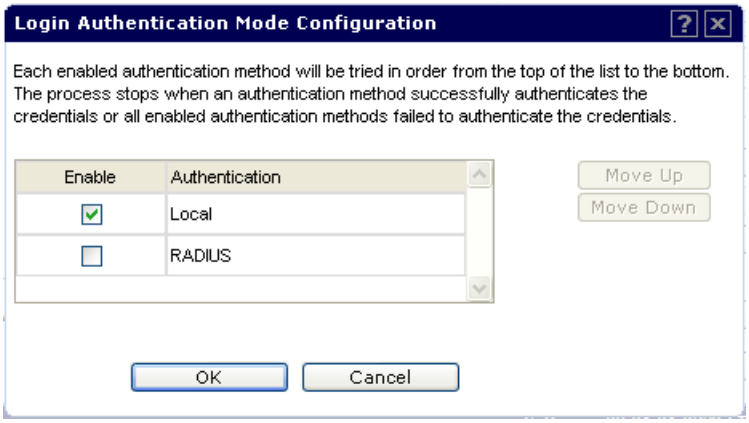
1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.

2. In the left pane, click **Login Management**. The **Login Management** screen is displayed.

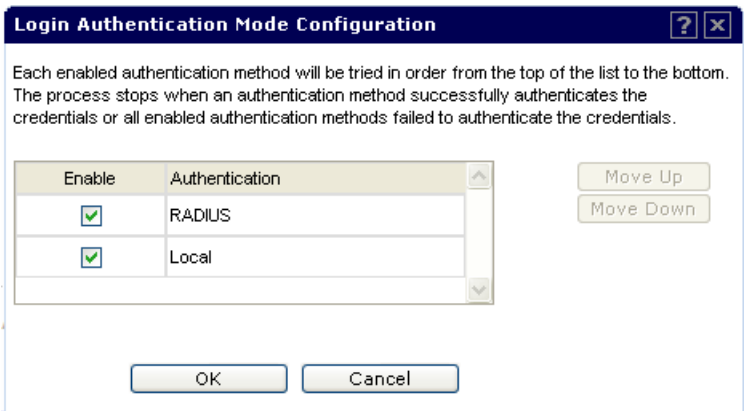


3. In the **Authentication mode** section, click **Configure**.

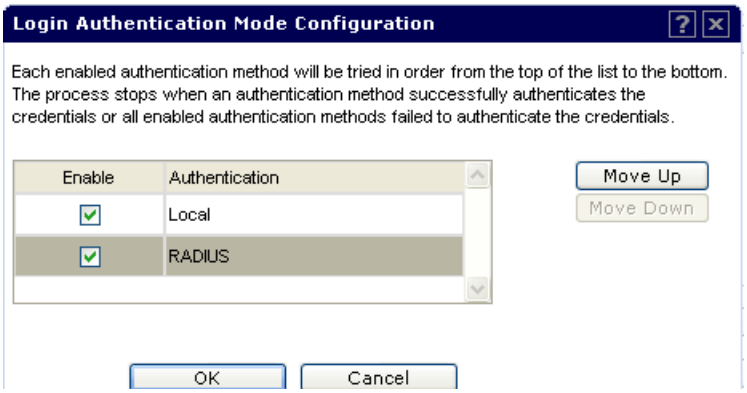
   The **Login Authentication Mode Configuration** window is displayed.


Login Authentication Mode Configuration
Each enabled authentication method will be tried in order from the top of the list to the bottom. The process stops when an authentication method successfully authenticates the credentials or all enabled authentication methods failed to authenticate the credentials.
Enable
Authentication
Local
RADIUS
Move Up
Move Down
OK
Cancel

4. Select the **Local** and **RADIUS** checkbox.


Login Authentication Mode Configuration
Each enabled authentication method will be tried in order from the top of the list to the bottom. The process stops when an authentication method successfully authenticates the credentials or all enabled authentication methods failed to authenticate the credentials.
Enable
Authentication
RADIUS
Local
Move Up
Move Down
OK
Cancel

5. If necessary, select **RADIUS** and use the **Move Up** button to move **RADIUS** to the top of the list.


Login Authentication Mode Configuration
Each enabled authentication method will be tried in order from the top of the list to the bottom. The process stops when an authentication method successfully authenticates the credentials or all enabled authentication methods failed to authenticate the credentials.
Enable
Authentication
Local
RADIUS
Move Up
Move Down
OK
Cancel

6. Click **OK**.
7. On the **Login Management** screen, click **Save**.

For information on setting RADIUS login authentication settings, see "Configuring the RADIUS Login Authentication Mode" on page 2-38.

For information on setting local login authentication settings, see "Configuring the Local Login Authentication Mode and Adding New Users" on page 2-36.

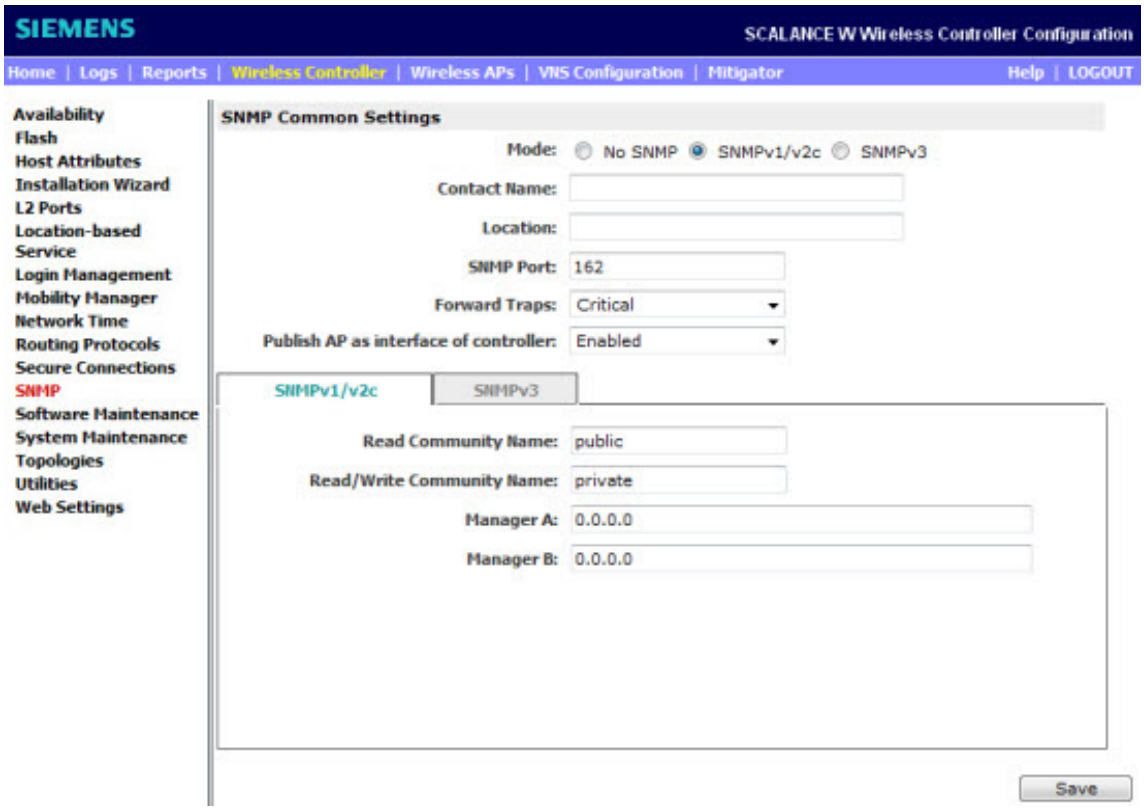
Configuring SNMP

The SCALANCE IWLAN Controller supports the Simple Network Management Protocol (SNMP) for retrieving statistics and configuration information. If you enable SNMP on the SCALANCE IWLAN Controller, you can choose either SNMPv3 or SNMPv1/v2 mode. If you configure the SCALANCE IWLAN Controller to use SNMPv3, then any request other than SNMPv3 request is rejected. The same is true if you configure the SCALANCE IWLAN Controller to use SNMPv1/v2.

To Configure SNMP:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.

2. In the left pane, click **SNMP**. The **SNMP** screen is displayed.



3. In the SNMP Common Settings section, configure the following:
   - **Mode** — Select **SNMPv1/v2c** or **SNMPv3** to enable SNMP.
   - **Contact Name** — The name of the SNMP administrator.
   - **Location** — The physical location of the SCALANCE IWLAN Controller running the SNMP agent.
   - **SNMP Port** — The destination port for the SNMP traps. Possible ports are 0–65555.
   - **Forward Traps** — The lowest severity level of SNMP trap that you want to forward.
   - **Publish AP as interface of controller** — Enable or disable SNMP publishing of the access point as an interface to the SCALANCE IWLAN Controller.
4. Continue with the appropriate procedure for configuring SNMPv1/v2c-specific or SNMPv3-specific parameters.
   - Configuring SNMPv1/v2c-specific Parameters
   - Configuring SNMPv3-specific Parameters

Configuring SNMPv1/v2c-specific Parameters

1. Configure the following parameters on the **SNMPv1/v2c** tab:
   - **Read Community Name** — The password that is used for read-only SNMP communication.

- **Read/Write Community Name** — The password that is used for write SNMP communication.
- **Manager A** — The IP address of the server used as the primary network manager that will receive SNMP messages.
- **Manager B** — The IP address of the server used as the secondary network manager that will receive SNMP messages.

Note:
Manager A and Manager B address fields support both IPv4 or IPv6 addresses.

2. Click **Save**.

Configuring SNMPv3-specific Parameters

1. Configure the parameters following on the **SNMPv3** tab:
   - **Context String** — A description of the SNMP context.
   - **Engine ID** — The SNMPv3 engine ID for the SCALANCE IWLAN Controller running the SNMP agent. The engine ID must be from 5 to 32 characters long.
   - **RFC3411 Compliant** — The engine ID will be formatted as defined by SnmpEngineID textual convention (that is, the engine ID will be prepended with SNMP agents' private enterprise number assigned by IANA as a formatted HEX text string).
2. Click **Add User Account**. The **Add SNMPv3 User Account** window displays.
3. Configure the following parameters:
   - **User** — Enter the name of the user account.
   - **Security Level** — Select the security level for this user account. Choices are: authPriv, authNoPriv, noAuthnoPriv.
   - **Auth Protocol** — If you have selected a security level of authPriv or authNoPriv, select the authentication protocol. Choices are: MD5, SHA, None.
   - **Auth Password** — If you have selected a security level of authPriv or authNoPriv, enter an authentication password.
   - **Privacy Protocol** — If you have selected the security level of authPriv, select the privacy protocol. Choices are: DES, None
   - **Privacy Password** — If you have selected the security level of authPriv, enter a privacy password.
   - **Engine ID** — If desired, enter an engine ID. The ID can be between 5 and 32 bytes long, with no spaces, control characters, or tabs.
   - **Destination IP** — If desired, enter the IP address of a trap destination.

Note:
The Destination IP address field supports both IPv4 or IPv6 addresses.

4. Click **OK**. The **Add SNMPv3 User Account** window closes.
5. Repeat steps 2 through 4 to add additional users.
6. In the **Trap 1** and **Trap 2** sections, configure the following parameters:
   - **Destination IP** — The IP address of the machine monitoring SNMPv3 traps

Note:
The Destination IP address field supports both IPv4 or IPv6 addresses.

- **User Name** — The SNMPv3 user to configure for use with SNMPv3 traps

7. Click **Save**.

Editing an SNMPv3 User

To Edit an SNMPv3 User:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **SNMP**. The **SNMP** screen is displayed.
3. Click the **SNMPv3** tab.
4. Select an SNMP user.
5. Click **Edit Selected User**. The **Edit SNMPv3 User Account** window displays.
6. Edit the user configuration as desired.
7. Click **OK**. The **Edit SNMPv3 User Account** window closes.
8. Click **Save**.

Deleting an SNMPv3 User

To Delete an SNMPv3 User:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **SNMP**. The **SNMP** screen is displayed.
3. Click the **SNMPv3** tab.
4. Select an SNMP user.
5. Click **Delete Selected User**. You are prompted to confirm that you want to delete the selected user.
6. Click **OK**.

Configuring Network Time

You should synchronize the clocks of the SCALANCE IWLAN Controller and the Wireless APs to ensure that the logs and reports reflect accurate time stamps. For more information, see Chapter 16, **Working with Reports and Statistics**.

The normal operation of the SCALANCE IWLAN Controller will not be affected if you do not synchronize the clock. The clock synchronization is necessary to ensure that the logs display accurate time stamps. In addition, clock synchronization of network elements is a prerequisite for the following configuration:

- Mobility Manager
- Session Availability

Network Time Synchronization

Network time is synchronized in one of two ways:

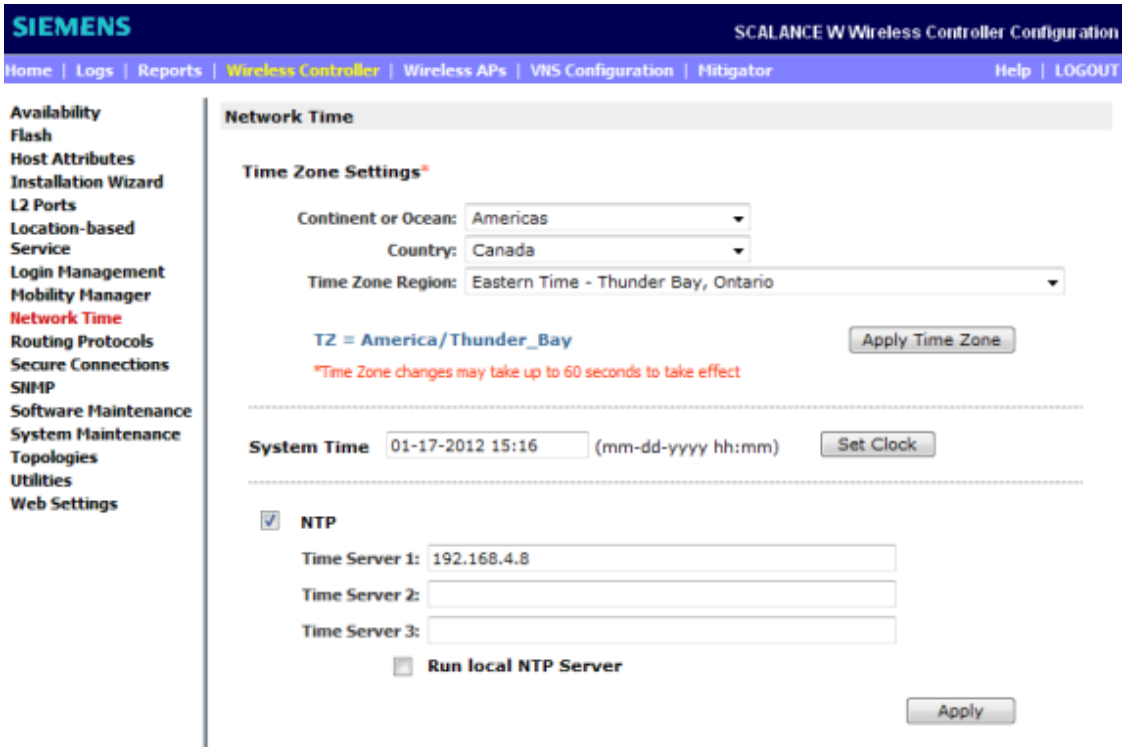
- Using the system's time — The system's time is the SCALANCE IWLAN Controller's time.
- Using Network Time Protocol (NTP) — The Network Time Protocol is a protocol for synchronizing the clocks of computer systems over packet-switched data networks.

The SCALANCE IWLAN Controller automatically adjusts for any time change due to Daylight Savings time.

Configuring the Network Time Using the System's Time

To Configure the Network Time, Using the System's Time:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **Network Time**. The **Network Time** screen is displayed.



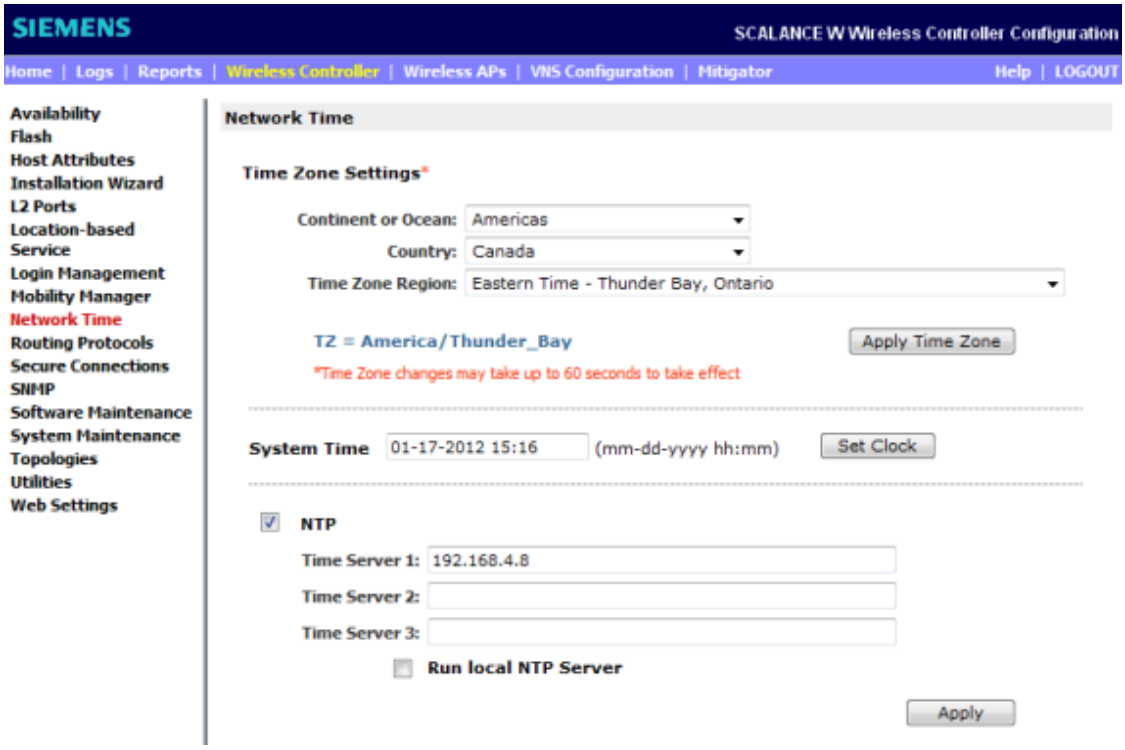
3. From the **Continent or Ocean** drop-down list, click the appropriate large-scale geographic grouping for the time zone.
4. From the **Country** drop-down list, click the appropriate country for the time zone. The contents of the drop-down list change, based on the selection in the **Continent or Ocean** drop-down list.
5. From the **Time Zone Region** drop-down list, click the appropriate time zone region for the selected country.
6. Click **Apply Time Zone**.
7. In the **System Time** box, type the system time.

8. Click **Set Clock**.
9. The WLAN network time is synchronized in accordance with the SCALANCE IWLAN Controller's time.

Configuring the Network Time Using an NTP Server

To configure the network time using an NTP server:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **Network Time**. The **Network Time** screen is displayed.



3. From the **Continent or Ocean** drop-down list, click the appropriate large-scale geographic grouping for the time zone.
4. From the **Country** drop-down list, click the appropriate country for the time zone. The contents of the drop-down list change, based on the selection in the **Continent or Ocean** drop-down list.
5. From the **Time Zone Region** drop-down list, click the appropriate time zone region for the selected country.
6. Click **Apply Time Zone**.
7. In the **System Time** box, type the system time.
8. Select the **Use NTP** checkbox.

Note:
If you want to use the SCALANCE IWLAN Controller as the NTP Server, select the **Run local NTP Server** checkbox, and then skip to Step 11.

9. In the **Time Server 1** text box, type the IP address or FQDN (Full Qualified Domain Name) of an NTP time server that is accessible on the enterprise network.

Note:
The Time Server fields supports both IPv4 and IPv6 addresses.

10. Repeat for **Time Server2** and **Time Server3** text boxes.

    If the system is not able to connect to the **Time Server 1**, it will attempt to connect to the additional servers that have been specified in **Time Server 2** and **Time Server 3** text boxes.

11. Click **Apply**.

12. The WLAN network time is synchronized in accordance with the specified time server.

Configuring Secure Connections

The controllers communicate amongst themselves using a secure protocol. Among other things, this protocol is used to share between controllers the data required for high availability. The protocol requires the use of a shared secret for mutual authentication of the end points.

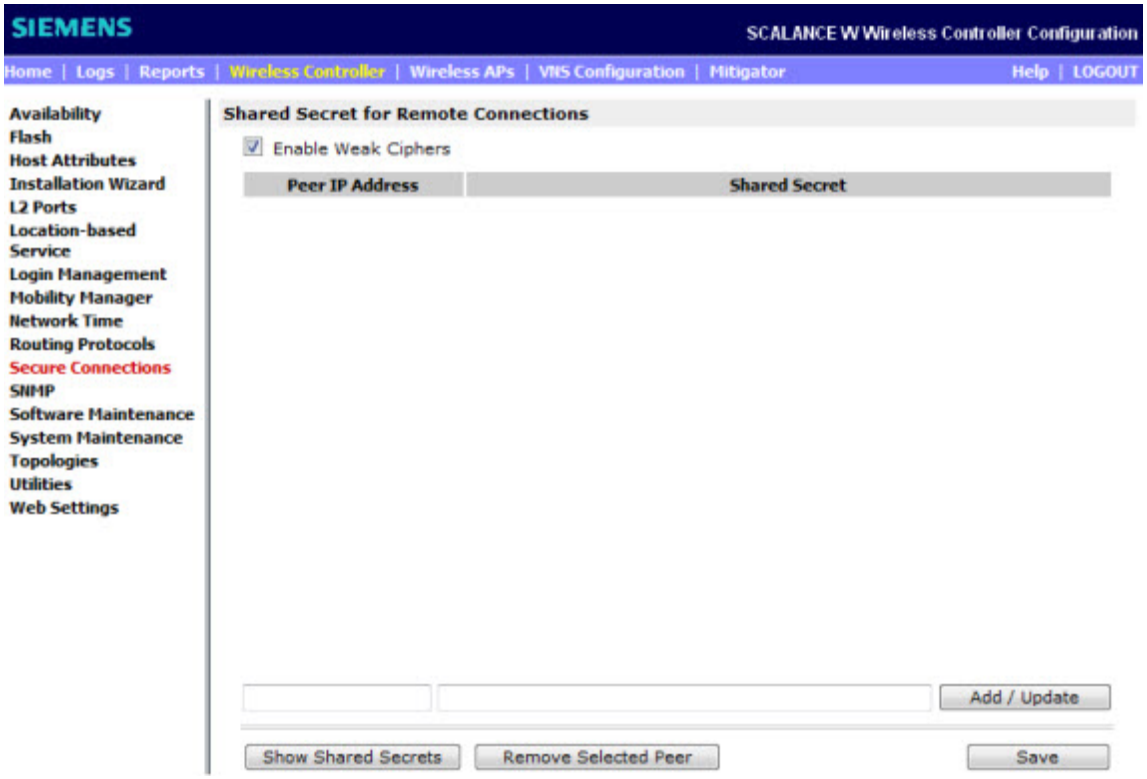
By default the controllers use a well known factory default shared secret. This makes it easy to get up and running but is not as secure as some sites require.

The controllers allow the administrator to change the shared secret used by the secure protocol. In fact the controllers can use a different shared secret for each individual end point to which they connect with the protocol.

To configure the shared secret for a connection on the controller:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.

2. In the left pane, click **Secure Connections**. The **Secure Connections** screen is displayed.



3. Enter the Server IP address of the other end of the secure protocol tunnel and the shared secret to use.
4. Click **Add/Update**.
5. Click **Save.**

Configuring DNS Servers for Resolving Host Names of NTP and RADIUS Servers

Since the **Global Settings** screen (**top menu** > **VNS Configuration** > **Global Settings**) allows you to set up NTP and RADIUS servers by defining their host names, you have to configure your DNS servers to resolve the host names of NTP and RADIUS servers to the corresponding IP addresses.

Note:
For more information on RADIUS server configuration, see "Defining RADIUS Servers and MAC Address Format" on page 7-4.

You can configure up to three DNS servers to resolve NTP and RADIUS server host names to their corresponding IP addresses.

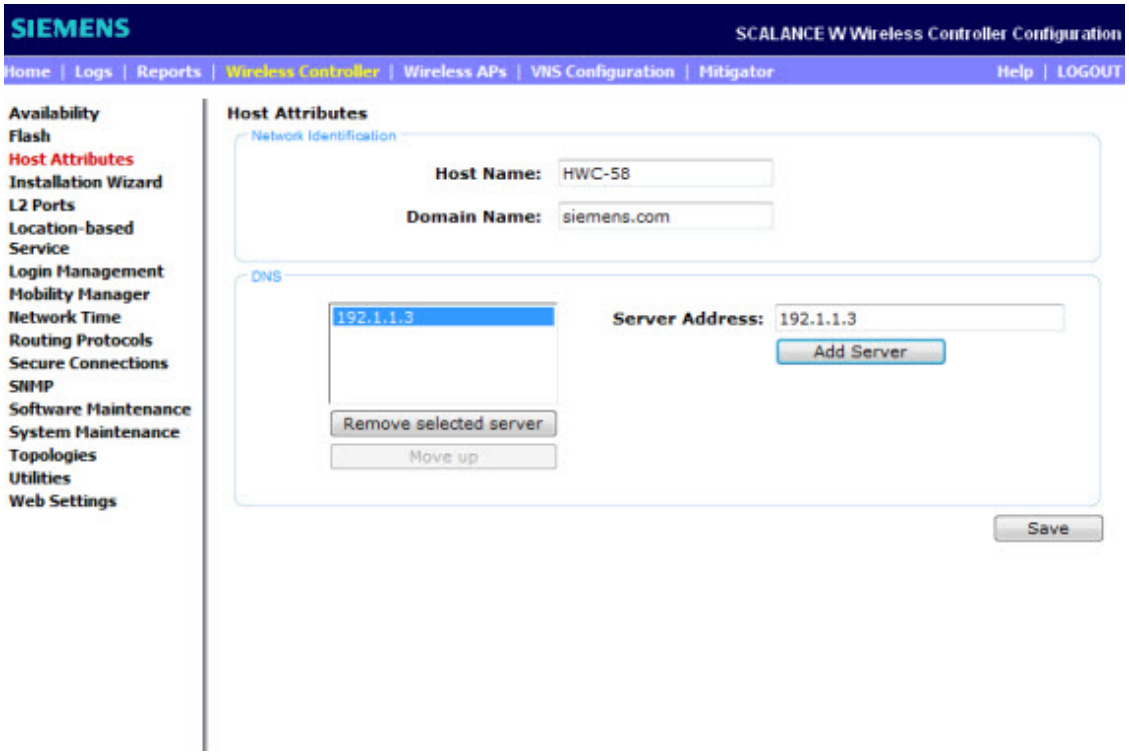
The SCALANCE IWLAN Controller sends the host name query to the first DNS server in the stack of three configured DNS servers. The DNS server resolves the queried domain name to an IP address and sends the result back to the SCALANCE IWLAN Controller.

If for some reason, the first DNS server in the stack of configured DNS servers is not reachable, the SCALANCE IWLAN Controller sends the host name query to the second DNS server in the stack.

If the second DNS server is also not reachable, the query is sent to the third DNS server in the stack.

To configure DNS servers for resolving host names of NTP and RADIUS servers:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **Host Attributes**. The **Host Attributes** screen is displayed.



3. In the DNS box, type the DNS server's IP address in the **Server Address** field and then click **Add Server**. The new server is displayed in the DNS servers' list.

Note:
You can configure up to three DNS servers. The Server Address field supports both IPv4 and IPv6 addresses.

4. To save your changes, click **Save**.

Using an AeroScout/Ekahau Location-based Solution

You can deploy your SCALANCE IWLAN Controller and Wireless APs as part of an AeroScout or Ekahau location-based solution.

On the SCALANCE IWLAN Controller, you configure the AeroScout/Ekahau server IP address and enable the location-based service. The AeroScout/Ekahau server is aware only of the SCALANCE IWLAN Controller IP address and is notified of the operational APs by the Controller.

On the APs that you want to participate in the location-based service, you enable the location-based service.

Note:
Participating Wireless APs must use the 2.4 GHz band.

Once you have enabled the location-based service on the SCALANCE IWLAN Controller and the participating Wireless APs, at least one of the participating Wireless APs will receive reports from an AeroScout/Ekahau Wi-Fi RFID tag in the 2.4GHZ band. The tag reports are collected by the AP and forwarded to the AeroScout/Ekahau server by encapsulating the tag reports in a WASSP tunnel and routing them as IP packets through the SCALANCE IWLAN Controller.

Note:
Tag reports are marked with UP=CS5, and DSCP = 0xA0. On the SCALANCE IWLAN Controller, tag reports are marked with UP=CS5 to the core (if 802.1p exists).

An AP's tag report collection status is reported in the Wireless AP Inventory report. For more information, see "Viewing Routing Protocol Reports" on page 16-20.

If availability is enabled, tag report transmission pauses on failed over APs until they are configured and notified by the AeroScout/Ekahau server.

When AeroScout/Ekahau support is disabled on the SCALANCE IWLAN Controller, the SCALANCE IWLAN Controller does not communicate with the AeroScout/Ekahau server and the APs do not perform any AeroScout/Ekahau-related functionality.

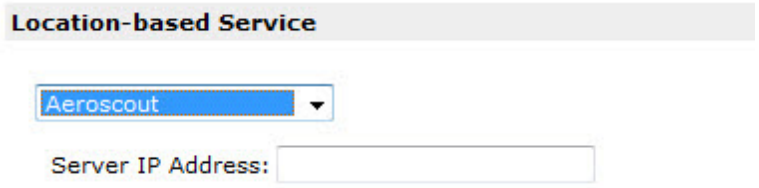
Ensure that your AeroScout/Ekahau tags are configured to transmit on all non-overlapping channels (1, 6 and 11) and also on channels above 11 for countries where channels above 11 are allowed. Refer to AeroScout/Ekahau documentation for proper deployment of the AeroScout/Ekahau location-based solution.

To Configure a SCALANCE IWLAN Controller for Use with an AeroScout/Ekahau Solution:

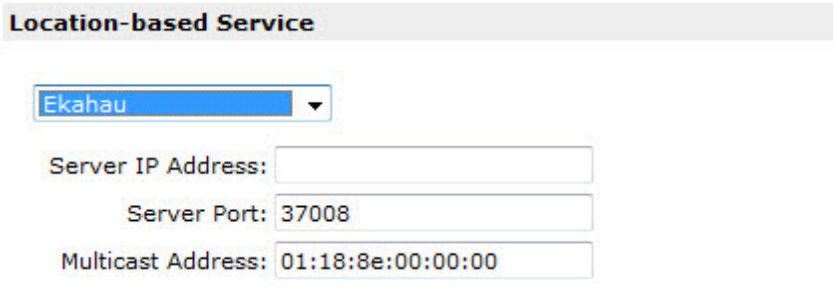
1. From the top menu, click **Wireless Controller.** The **Wireless Controller Configuration** screen is displayed.

2. In the left pane, click **Location-based Service**. The **Location-based Service** screen is displayed.

3. From the **Location-based Service** drop-down list, click the desired location-based service for the SCALANCE IWLAN Controller.
4. If Aeroscout is selected, enter the Server IP Address of the AeroScout server in the **Aeroscout Address** field.



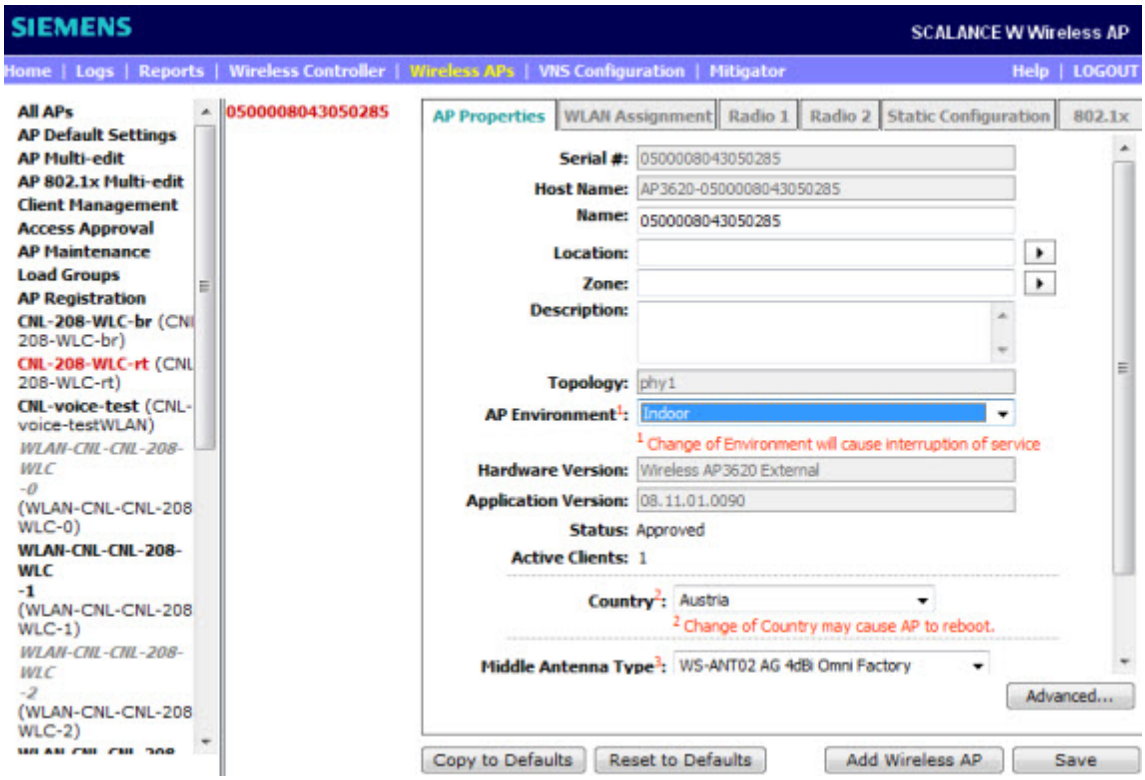
5. If Ekahau is selected, enter the Server IP Address, Server Port, and Multicast Address of the Ekahau server on the **Ekahau Address** field.



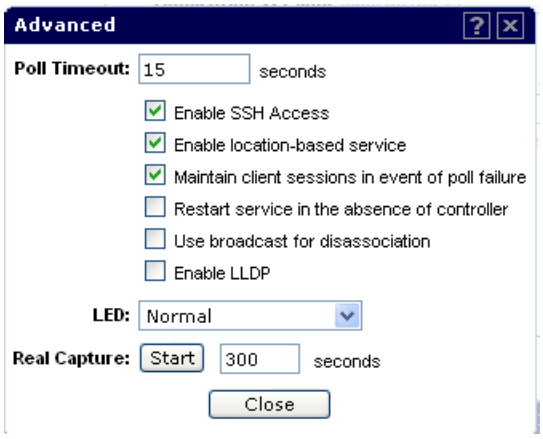
6. Click **Save**.

   You must now assign Wireless APs to participate in the location-based service.

7. From the top menu, click **Wireless APs**. The **All APs** screen is displayed.



8. Select an AP.
9. Click **Advanced**. The **Advanced** window displays.



10. Select the **Enable location-based service** field.
11. Click **Close**. The **Advanced** window closes.
12. Repeats steps 7 through 10 for each additional AP that you want to participate in the location-based service.
13. Click **Save**.

Note:
You can also enable location based service on APs through the **Location-based service** field on the **AP Multi-edit** screen and the **Advanced** window of the **AP Default Settings** screen.

Additional Ongoing Operations of the System

Ongoing operations of the SCALANCE WLC711 system can include the following:

- SCALANCE IWLAN Controller System Maintenance
- Wireless AP Maintenance
- Client Disassociate
- Logs and Traces
- Reports and Displays

For more information, see Chapter 17, **Performing System Administration** or the SCALANCE WLC711 *Maintenance Guide.*

3

Configuring the Wireless AP

This chapter describes the Wireless Access Point (AP) and the SCALANCE WLC711 solution, including:

For information about...	Refer to page...
	3-1
Discovery and Registration Overview	3-9
Adding and Registering a Wireless AP Manually	3-18
Configuring Wireless AP Settings	3-19
Configuring VLAN Tags for Wireless APs	3-44
Modifying a Wireless AP's Properties Based on a Default AP Configuration	3-66
Modifying the Wireless AP's Default Setting Using the Copy to Defaults Feature	3-66
Configuring Multiple Wireless APs Simultaneously	3-66
Configuring Co-located APs in Load Balance Groups	3-69
Configuring an AP Cluster	3-75
Performing Wireless AP Software Maintenance	3-76

Wireless AP Overview

The Wireless AP uses the 802.11 wireless standards (802.11a/b/g/n) for network communications and bridges network traffic to an Ethernet LAN. The Wireless AP runs proprietary software that allows it to communicate only with the SCALANCE IWLAN Controller.

The Wireless AP physically connects to a LAN infrastructure and establishes an IP connection to the SCALANCE IWLAN Controller, which manages the Wireless AP configuration through the SCALANCE W Wireless Assistant. The SCALANCE IWLAN Controller also provides centralized management (verification and upgrade) of the Wireless AP firmware image.

A UDP-based protocol enables communication between the Wireless AP and the SCALANCE IWLAN Controller. The UDP-based protocol encapsulates IP traffic from the Wireless AP and directs it to the SCALANCE IWLAN Controller. The SCALANCE IWLAN Controller decapsulates the packets and routes them to the appropriate destinations, while managing sessions and applying policies.

Deploying a Wireless AP with External Antennas

Some Wireless AP models support external antennas. The external antennas are individually certified and determine the available channel list and the maximum transmitting power for the country in which the Wireless AP is deployed. For more details refer to the manuals of the respective antennas.

The following table shows which Wireless AP models have external or internal antennas.

Table 3-1 Wireless APs and Antenna Compatibility

Model Name	Order Number	Antenna/Connector	802.11n
SCALANCE W786C-2 RJ45	6GK5786-2FC00-1AA0	external / R-SMA	yes
SCALANCE W786C-2IA RJ45	6GK5786-2HC00-1AA0	internal	yes
SCALANCE W788C-2 RJ45	6GK5788-2FC00-1AA0	external / R-SMA	yes
SCALANCE W788C-2 M12	6GK5788-2GD00-1AA0	external / N	yes
SCALANCE W786-2HPW	6GK5786-2AA60-1CA0	external / R-SMA	no
SCALANCE W786-2HPW (FO)	6GK5786-2AB60-1CA0	external / R-SMA	no
SCALANCE W786-2HPW	6GK5786-2BA60-1CA0	internal	no
SCALANCE W786-2HPW (FO)	6GK5786-2BB60-1CA0	internal	no

Note:
An individual Wireless AP cannot support an indoor mounted antenna and an outdoor mounted antenna simultaneously.

Deploying a Wireless AP with external antennas is part of the Wireless AP configuration process. For more information, see "Configuring Wireless AP Settings" on page 3-19.

Each model has two radios — Radio 1 and Radio 2. Figure 3-1 shows a block diagram of the Siemens Outdoor Wireless AP equipped with external antennas.

SCALANCE Outdoor Wireless AP Radios

The SCALANCE W786-2 HPW Outdoor Wireless AP is equipped with two radios — Radio 1 and Radio 2.

- **Radio 1** supports the 5 GHz radio, with radio mode **a.**
- **Radio 2** supports the 2.4 GHz radio, with radio modes **b**, **g**, and **b/g.**

Radio 1 and **Radio 2** are connected to both external antennas — EA1 and EA2.

The following is a block diagram of the SCALANCE W786-2 HPW Outdoor Wireless AP equipped with external antennas.

Figure 3-1 SCALANCE W786-2 HPW Outdoor Wireless AP

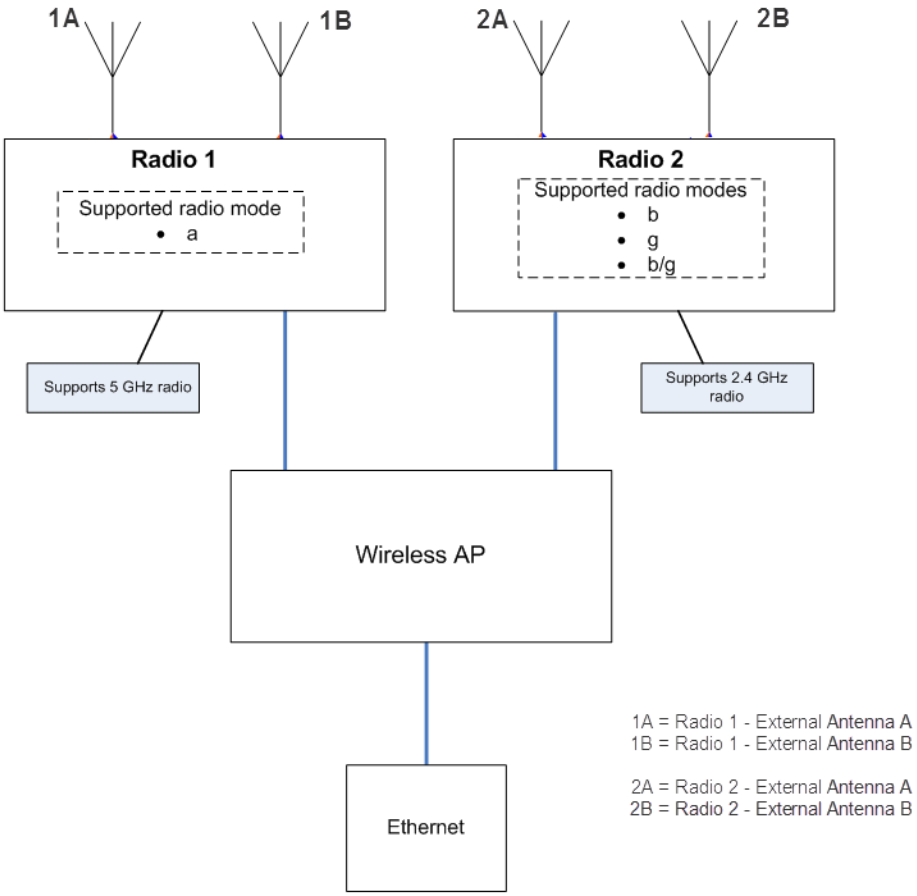


Figure 3-1 illustrates the following:

- The SCALANCE Outdoor Wireless AP has two radios — **Radio 1** and **Radio 2**.
- **Radio 1** supports the 5 GHz radio, with radio mode **a.**
- **Radio 2** supports the 2.4 GHz radio, with radio modes **b**, **g**, and **b/g.**
- Radio 1 and Radio 2 are connected to external antennas — 1A, 1B and 2A, 2B.

5 GHz radio supporting the 802.11a standard — The 802.11a standard is an extension to 802.11 that applies to wireless LANs and provides up to 54 Mbps in the 5-GHz band. The 802.11a standard uses an orthogonal frequency division multiplexing encoding scheme, rather than Frequency-Hopping Spread Spectrum (FHSS) or Direct-Sequence Spread Spectrum (DSSS).

2.4 GHz radio supporting the 802.11b/g standards — The 802.11g standard applies to wireless LANs and specifies a transmission rate of 54 Mbps. The 802.11b (High Rate) standard is an extension to 802.11 that specifies a transmission rate of 11 Mbps. Since 802.11g uses the same communication frequency range as 802.11b (2.4 GHz), 802.11g devices can co-exist with 802.11b devices on the same network.

The radios are enabled or disabled through the SCALANCE IWLAN Controller. Both radios can be enabled to offer service simultaneously. For more information, see "Modifying Wireless AP W786-2HPW Radio Properties" on page 3-39.

The Unlicensed National Information Infrastructure (U-NII) bands all lie within the 5-GHz band, designed for short-range, high-speed, wireless networking communication.

The Wireless AP supports the full range of 802.11a:

- 5.15 to 5.25 GHz — U-NII Low Band
- 5.25 to 5.35 GHz — U-NII Middle Band
- 5.47 to 5.725 GHz — UNII 2+
- 5.725 to 5.825 GHz — U-NII High Band

Siemens Wireless 802.11n AP

The SCALANCE IWLAN 802.11n AP delivers total data rates of up to 450Mbps, depending on its configuration. The improved throughput of 450 Mbps is spread over a number of simultaneous users so that the Wireless 802.11n AP provides mobile users with an experience similar to that of a wired 100 Mbps Ethernet connection — the standard for desktop connectivity.

To configure the SCALANCE IWLAN 802.11n AP to achieve this high link rate, see "Achieving High Throughput with the Wireless 802.11n AP" on page 3-37.

Note:
The Wireless 802.11n AP is backward-compatible with existing 802.11a/b/g networks.

Note:
The Wireless 802.11n AP cannot operate as a stand-alone access point.

MIMO

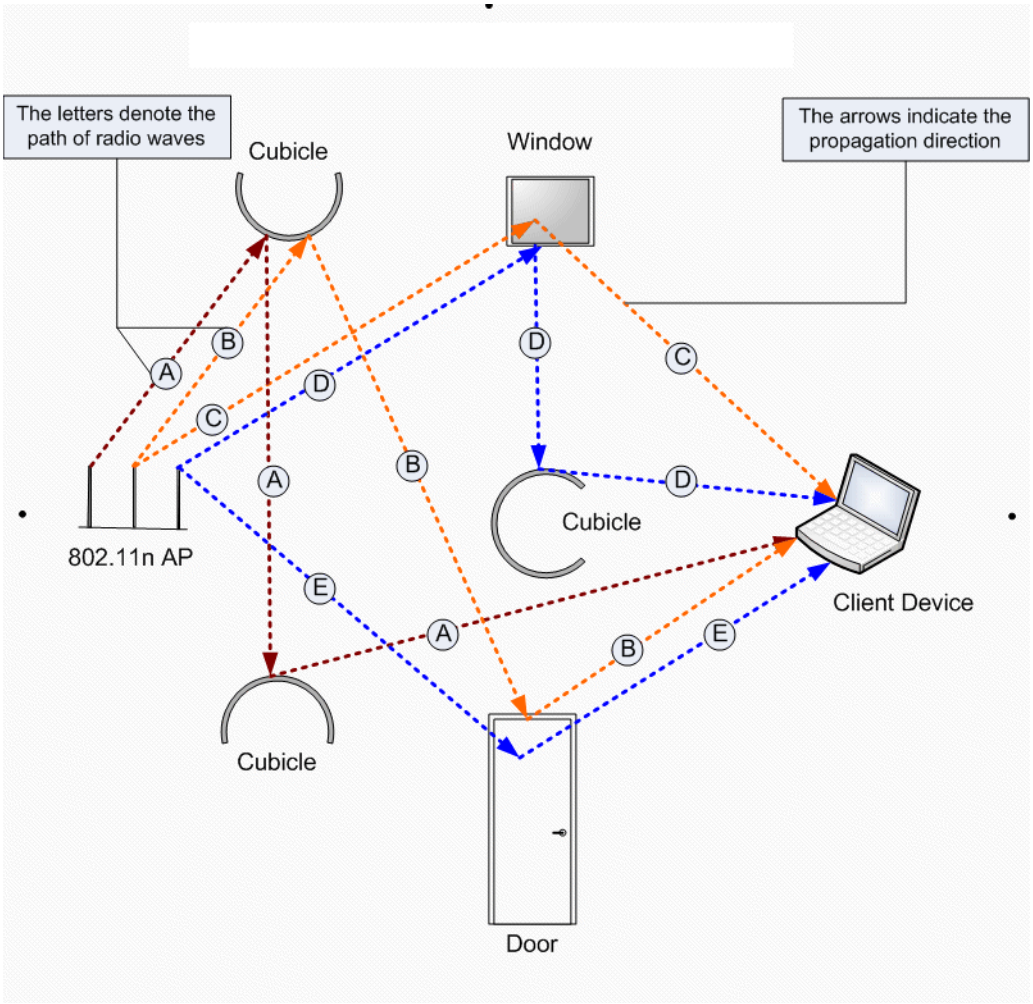
The mainstay of 802.11 AP is MIMO (multiple input, multiple output) — a technology that uses advanced signal processing with multiple antennas to improve the throughput. MIMO takes advantage of multipath propagation to decrease packet retries to improve the fidelity of the wireless network.

The 802.11n AP's MIMO radio sends out one or two radio signals through its three antennas. Each of these signals is called a spatial stream. Because the location of the antennas on the 802.11n AP is spaced out, each spatial stream follows a slightly different path to the client device. Furthermore, the two spatial streams get multiplied into several streams as they bounce off the obstructions in the vicinity. This phenomenon is called multipath. Since these streams are bounced from different surfaces, they follow different paths to the client device. The client device, which is also 802.11n compliant, also has multiple antennas. Each of the antennas independently decodes the arriving signal. Then each antenna's decoded signal is combined with the decoded signals from the other antennas. The software algorithm uses the redundancy to extract one or two spatial streams and enhances the streams' signal to noise ratio.

The client device too sends out one or two spatial streams through its multiple antennas. These spatial streams get multiplied into several steams as they bounce off the obstructions in the vicinity en route to the 802.11n AP. The 802.11n AP's MIMO receiver receives these multiple streams with three antennas. Each of the three antennas independently decodes the arriving signal. Then each antennas's decoded signal is combined with the decoded signals from the other antennas. The 802.11n AP's MIMO receiver again uses the redundancy to extract one or two spatial streams and enhances the streams' signal to noise ratio.

By using the multiple streams, MIMO doubles the throughput.

Figure 3-2 MIMO in SCALANCE IWLAN 802.11n AP



Note:
MIMO should not be confused with the **Diversity** feature. While **Diversity** is the use of two antennas to increase the odds that a better radio stream is received on either of the antennas, MIMO antennas radiate and receive multi-streams of the same packet to achieve the increased throughput.
The **Diversity** feature is meant to offset the liability of RF corruption, arising out of multipath, whereas MIMO converts the liability of multipath to its advantage.

Because the 802.11n AP operates with multiple antennas, it is capable of picking up even the weakest signals from the client devices.

Channel Bonding

In addition to MIMO technology, the 802.11n AP makes a number of additional changes to the radio to increase the effective throughput of the Wireless LAN. The radios of regular SCALANCE IWLAN APs use radio channels that are 20 MHz wide. This means that the channels must be spaced at 20 MHz to avoid interference. The radios of 802.11n AP can use two channels at the same time to create a 40 MHz wide channel. By using the two 20 MHz channels in this manner, the 802.11n AP achieves more than double the throughput. The 40-MHz channels in 802.11n are two adjacent 20-MHz channels, bonded together. This technique of using two channels at the same time is called channel bonding.

Shortened Guard Interval

The purpose of the guard interval is to introduce immunity to propagation delays, echoes and reflections of symbols in orthogonal frequency division multiplexing (OFDM) — a method by which information is transmitted via a radio signal in Wireless APs.

In OFDM, the beginning of each symbol is preceded by a guard interval. As long as the echoes fall within this interval, they will not affect the safe decoding of the actual data, as data are only interpreted outside the guard interval. Longer guard periods reduce the channel efficiency. The 802.11n AP provides reduced guard periods, thereby increasing the throughput.

MAC Enhancements

The 802.11n AP also has an improved MAC layer protocol that reduces overhead (in the MAC layer protocol) and contention losses. This results in increased throughput.

Models

The Wireless 802.11n AP is available in the following models:

- SCALANCE W786C-2 RJ45 — Six external antennas
- SCALANCE W786C-2IA RJ45 — Six internal antennas
- SCALANCE W788C-2 RJ45 — Six external antennas
- SCALANCE W788C-2 M12 — Six external antennas

Environment

With the exception of WS-W786C, Wireless 802.11n APs cannot be deployed in an outdoor environment.

SCALANCE IWLAN 802.11n AP's Radios

The SCALANCE IWLAN 802.11n AP is equipped with two radios — Radio 1 and Radio 2. The following is a block diagram of the SCALANCE IWLAN 802.11n AP equipped with external antennas.

Figure 3-3 SCALANCE IWLAN 802.11n AP's Baseband

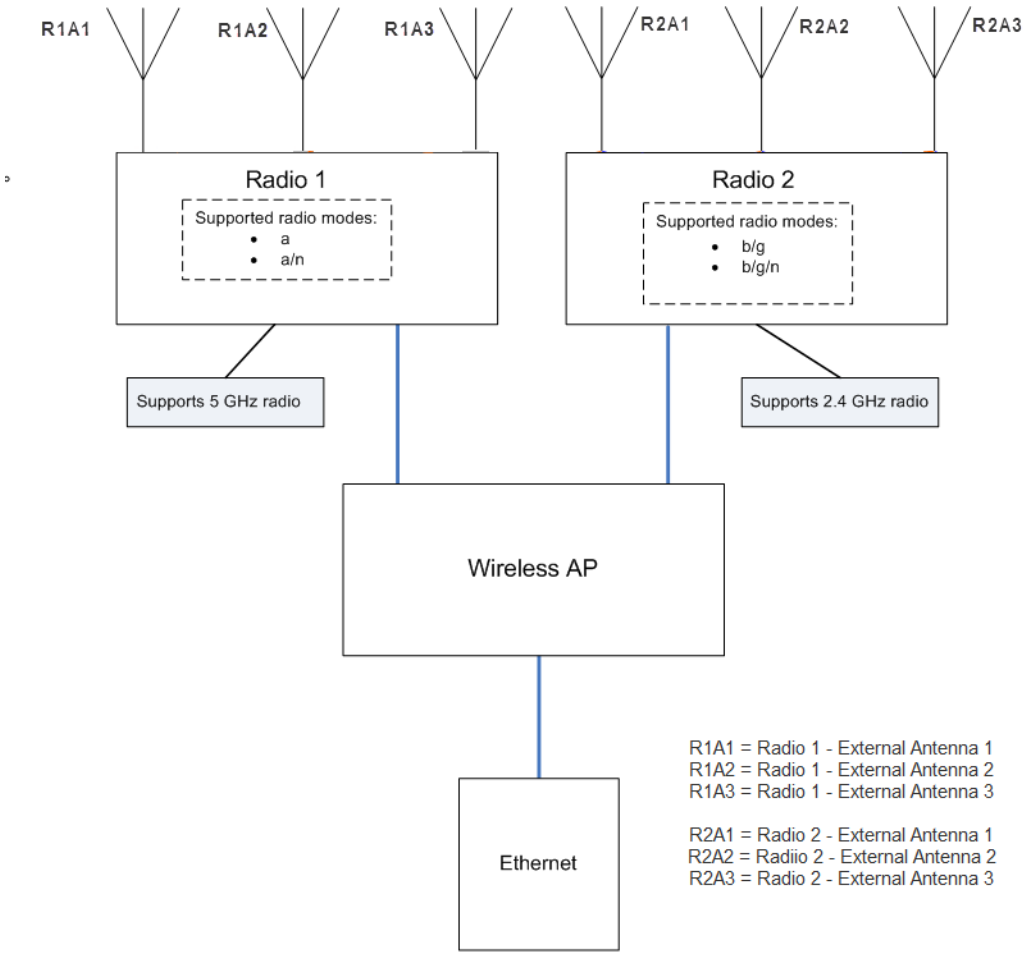


Figure 3-3 illustrates the following:

- The SCALANCE IWLAN 802.11n AP has two radios — **Radio 1** and **Radio 2**.
- **Radio 1** supports the 5 GHz radio, with radio modes **a**, **a/n,** and **n-strict**.
- **Radio 2** supports the 2.4 GHz radio, with radio modes **b**, **g**, **b/g, b/n**, **b/g/n,** and **n-strict**.
- Radio 1 is connected to external antennas R1A1, R1A2, R1A3, and Radio 2 is connected to external antennas R2A1, R2A2, R2A3.

5 GHz radio supporting the 802.11a/n standard — When in legacy 802.11a mode, the SCALANCE IWLAN 802.1n AP supports data rates up to 54Mbps. The modulation used is OFDM. In 802.11n mode there are two supported channel bandwidths, 20MHz and 40MHz. The 802.11n AP supports up to 450Mbps in 40MHz channels and 216Mbps in 20MHz channels. The modulation used is MIMO-OFDM with one or two spatial streams.

2.4 GHz radio supporting the 802.11b/g/n standard — When in legacy 802.11b/g mode, the 802.11n APs support data rates up to 54Mbps, identical to the Standard APs. The modulation used is OFDM for 11g and CCK for 11b. In 802.11n mode there are two supported channel bandwidths, 20MHz and 40MHz. The 802.11n APs support up to 450Mbps in 40MHz channels and 216Mbps in 20MHz channels. The modulation used is MIMO-OFDM with up to threespatial streams.

The radios are enabled or disabled through the SCALANCE W Wireless Assistant. For more information, see “Modifying Wireless 802.11n AP W786C/W788C Radio Properties” on page 3-27.

The Unlicensed National Information Infrastructure (U-NII) bands all lie within the 5-GHz band, designed for short-range, high-speed, wireless networking communication.

The 802.11n AP supports the full range of frequencies available in the 5GHz band:

- 5150 to 5250 MHz - U-NII Low band
- 5250 to 5350 MHz - U-NII Middle Band
- 5470 to 5700 MHz - U-NII Worldwide
- 5725 to 5825 MHz - U-NII High Band

Note:
The Wireless 802.11n AP can achieve link rates of up to 450Mbps. To achieve this level of high link rates, specific items need to be configured through the SCALANCE W Wireless Assistant. For more information, see “Achieving High Throughput with the Wireless 802.11n AP” on page 3-37.

Wireless AP International Licensing

The Wireless AP must be configured to operate on the appropriate radio band in accordance with the regulations of the country in which it is being used.

To configure the appropriate radio band according to the country of operation, use the SCALANCE IWLAN Controller. For more information, see the manuals of the respective APs.

Wireless AP Default IP Address and First-time Configuration

The Wireless APs are shipped from the factory with a default IP address — 192.168.1.20. The default IP address simplifies the first-time IP address configuration process for Wireless APs. If the Wireless AP fails in its discovery process, it returns to its default IP address. This Wireless AP behavior ensures that only one Wireless AP at a time can use the default IP address on a subnet. For more information, see “Discovery and Registration Overview” on page 3-9.

The Wireless APs can acquire their IP addresses by one of two methods:

- **DHCP assignment** — When the Wireless AP is powered on, it attempts to reach the DHCP server on the network to acquire the IP address. If the Wireless AP is successful in reaching the DHCP server, the DHCP server assigns an IP address to the Wireless AP.
  - If the DHCP assignment is not successful in the first 60 seconds, the Wireless AP returns to its default IP address.
  - The Wireless AP waits for 30 seconds in default IP address mode before again attempting to acquire an IP address from the DHCP server.
  - The process repeats itself until the DHCP assignment is successful, or until an administrator assigns the Wireless AP an IP address, using static configuration.

Note:
DHCP assignment is the default method for the Wireless AP configuration. DHCP assignment is part of the discovery process. For more information, see “Discovery and Registration Overview” on page 3-9.

- **Static configuration** — You can assign a static IP address to the Wireless AP, using the static configuration option. For more information, see the following section.

Note:
You can establish a telnet or SSH session with the Wireless AP during the time window of 30 seconds when the Wireless AP returns to its default IP address mode. If a static IP address is assigned during this period, you must reboot the Wireless AP for the configuration to take effect. For more information, see "Assigning a Static IP Address to the Wireless AP" on page 3-9.

Assigning a Static IP Address to the Wireless AP

Depending upon the network condition, you can assign a static IP address to the Wireless AP using the SCALANCE W Wireless Assistant (Controller's GUI). Refer to "Setting Up the Wireless AP Using Static Configuration" on page 3-39 for more information.

Table 3-2 CLI Commands to Configure a Static IP Address for a Wireless AP

Parameter Name	Description
dhcp disable	By default, the Wireless AP is configured to acquire its IP address via the DHCP assignment. The command disables the DHCP server.
ipaddr	Specifies the static IP address.
ipmask	Specifies the subnet

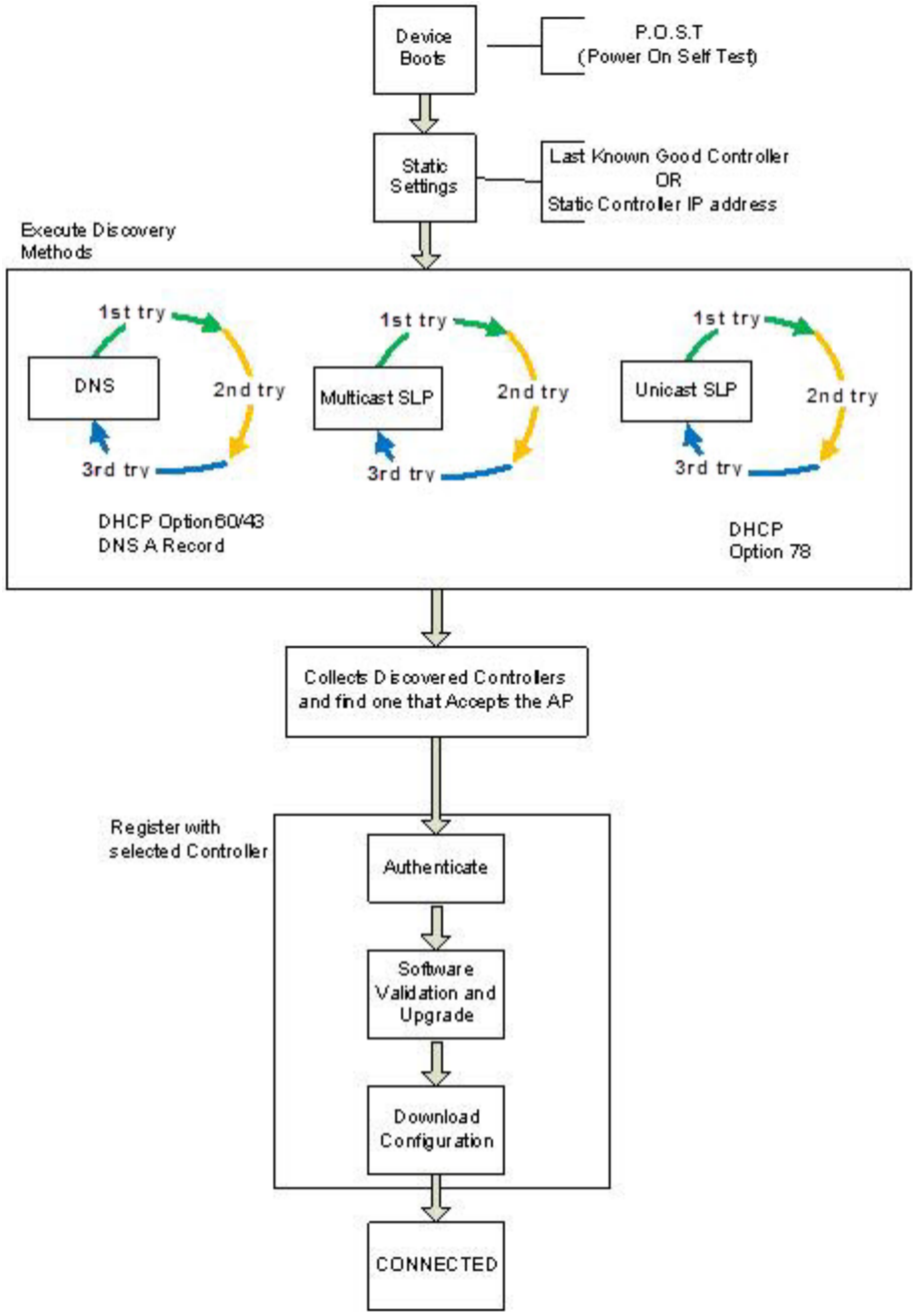
Table 3-3 CLI Commands to Configure a Static IP Address for a Wireless 802.11n AP

Parameter Name	Description
dhcp disable	By default, the Wireless AP is configured to acquire its IP address via the DHCP assignment. The command disables the DHCP server.
ipaddr	Specifies the IP address.
ipmask	Specifies the subnet.
gateway	Specifies the IP address of the network gateway.
capply	Applies the configuration.
csave	Saves the configuration.

Discovery and Registration Overview

When the Wireless AP is powered on, it automatically begins a discovery process to determine its own IP address and the IP address of the SCALANCE IWLAN Controller (see Figure 3-4 on page 3-10). When the discovery process is successful, the Wireless AP registers with the SCALANCE IWLAN Controller.

Figure 3-4 Wireless AP Discovery Process



Wireless AP Discovery

Wireless APs discover the IP address of a SCALANCE IWLAN Controller using a sequence of mechanisms that allow for the possible services available on the enterprise network. The discovery process is successful when the Wireless AP successfully locates a SCALANCE IWLAN Controller to which it can register.

Ensure that the appropriate services on your enterprise network are prepared to support the discovery process. The following steps summarize the discovery process:

1. Use the IP address of the SCALANCE IWLAN Controller to which the AP last connected successfully

   Once a Wireless AP has successfully registered with a SCALANCE IWLAN Controller, it recalls that controller's IP address, and uses that address on subsequent reboots. The Wireless AP bypasses discovery and goes straight to registration.

   If this discovery method fails, it cycles through the remaining steps.

2. Use the predefined static IP addresses for the SCALANCE IWLAN Controllers on the network (if configured).

   You can specify a list of static IP addresses of the SCALANCE IWLAN Controllers on your network. On the **Static Configuration** tab, add the addresses to the **Wireless Controller Search List**.

NOTICE

Wireless APs configured with a static Wireless Controller Search List can only connect to SCALANCE IWLAN Controllers in the list. Improperly configured Wireless APs cannot connect to a non-existent SCALANCE IWLAN Controller address, and therefore cannot receive a corrected configuration.

3. Use Dynamic Host Configuration Protocol (DHCP) Option 60 to query the DHCP server for available SCALANCE IWLAN Controllers. The DHCP server will respond to the Wireless AP with Option 43, which will list the available SCALANCE IWLAN Controllers.

   For the DHCP server to respond to a Wireless AP's Option 60 request, you must configure the DHCP server with the vendor class identifier (VCI) for each Wireless AP. You must also configure the DHCP server with the IP addresses of the SCALANCE IWLAN Controllers. For more information, refer to SCALANCE WLC711 *Getting Started Guide*.

4. Use a Domain Name Server (DNS) lookup for the host name Controller.domain-name.

   The Wireless AP tries the DNS server if it is configured in parallel with SLP unicast and SLP multicast.

   If you use this method for discovery, place an A record in the DNS server for Controller.<domain-name>. The <domain-name> is optional, but if used, ensure it is listed with the DHCP server.

5. Use a multicast SLP request to find SLP SAs

   The Wireless AP sends a multicast SLP request, looking for any SLP Service Agents providing the Siemens service.

   The Wireless AP will try SLP multicast in parallel with other discovery methods.

6. Use DHCP Option 78 to locate a Service Location Protocol (SLP) Directory Agent (DA), followed by a unicast SLP request to the Directory Agent.

   To use the DHCP and unicast SLP discovery method, you must ensure that the DHCP server on your network supports Option 78 (DHCP for SLP RFC2610). The Wireless APs use this method to discover the SCALANCE IWLAN Controller.

   This solution takes advantage of two services that are present on most networks:

   – **DHCP** — The standard is a means of providing IP addresses dynamically to devices on a network.

– **SLP —** A means of allowing client applications to discover network services without knowing their location beforehand. Devices advertise their services using a Service Agent (SA). In larger installations, a Directory Agent (DA) collects information from SAs and creates a central repository (SLP RFC2608).

The SCALANCE IWLAN Controller contains an SLP SA that, when started, queries the DHCP server for Option 78 and if found, registers itself with the DA as service type Siemens. The SCALANCE IWLAN Controller contains a DA (SLPD).

The Wireless AP queries DHCP servers for Option 78 to locate any DAs. The Wireless APs' SLP User Agent then queries the DAs for a list of Siemens SAs.

Option 78 must be set for the subnets connected to the ports of the SCALANCE IWLAN Controller and the subnets connected to the Wireless APs. These subnets must contain an identical list of DA IP addresses.

Registration After Discovery

Any of the discovery steps 2 through 6 can inform the Wireless AP of a list of multiple IP addresses to which the Wireless AP may attempt to connect. Once the Wireless AP has discovered these addresses, it sends out connection requests to each of them. These requests are sent simultaneously. The Wireless AP will attempt to register only with the first which responds to its request.

When the Wireless AP obtains the IP address of the SCALANCE IWLAN Controller, it connects and registers, sending its serial number identifier to the SCALANCE IWLAN Controller, and receiving from the SCALANCE IWLAN Controller a port IP address and binding key.

Once the Wireless AP is registered with a SCALANCE IWLAN Controller, you must configure the Wireless AP. After the Wireless AP is registered and configured, you can assign it to one or more Virtual Network Services (VNS) to handle wireless traffic.

Default Wireless AP Configuration

Default Wireless AP configuration acts as a configuration template that can be automatically assigned to new registering Wireless APs. The default Wireless AP configuration allows you to specify common sets of radio configuration parameters and VNS assignments for Wireless APs. For more information, see "Configuring the Default Wireless AP Settings" on page 3-53.

Understanding the Wireless AP LED Status

When you power on and boot the Wireless AP, you can follow its progress through the registration process by observing the LED sequence as described in the following section

Siemens Wireless AP LED Status

All Siemens Wireless AP models have the LEDs L1, PoE, P1, R1, R2 and F which are used to indicate the status of the Wireless AP. For the position of the LEDs, refer to the respective AP manual.

The R1, R2 and F LEDs work in conjunction to indicate the general, high-level and detailed state respectively. The remaining LEDs indicate link status.

Table 3-4 provides a composite view of the R1, R2 and F LEDs:

Table 3-4 Siemens Wireless AP LED Status

R1 LED	R2 LED	F LED	SCALANCE IWLAN Outdoor AP's detailed status
Off	Off	Blinking Red	Initialization: Power-on-self test (POST)
	Blinking Green	Blinking Red	Initialization: Random delay
	Solid Green	Blinking Red	Initialization: Vulnerable Period
		Solid Red	Reset to factory defaults
	Solid Green	Blinking Red	WDS scanning
Blinking Green/ Yellow	Off	Blinking Red	Network discovery: 802.1x authentication
		Solid Red	Failed 802.1x authentication
	Blinking Green/ Yellow	Blinking Red	Network discovery: DHCP
		Solid Red	Default IP address
	Solid Green/ Yellow	Blinking Red	Network discovery: WLC discovery/connect
		Solid Red	Discovery failed
Solid Green	Off	Blinking Red	Connecting with WLC: Registration
		Solid Red	Registration failed
	Blinking Green/ Yellow	Blinking Red	Connecting with WLC: Image upgrade
		Solid Red	Image upgrade failed
	Solid Green/ Yellow	Blinking Red	Connecting with WLC: Configuration
		Solid Red	Configuration failed
	Blinking Green/ Yellow	Off	AP operating and running normally: Forced image upgrade
		Solid Red	Image upgrade failed

Note:
After discovery is finished, the R1 and R2 LEDs will be Green for Ethernet uplink, and Yellow for WDS uplink.

Note:
If a fatal AP error occurs, the F LED will be solid Red.

LEDS Indicating WDS Strength

The AP indicates the WDS signal strength as a bar graph. To avoid confusion with startup LED behavior, the patterns go from right to left and an LED is always blinking at least twice as fast as the LEDs in normal mode.

Table 3-5 illustrates the behavior of the LED in WDS Signal Strength for AP models.

Table 3-5 LEDs Indicating Signal Strength

RSS (dBm)	LED					
	L1	**PoE**	**P1**	**R1**	**R2**	**F**
RSS ≤ -84	Off	Off	Off	Off	Off	Blinking red
-84 < RSS ≤ -77	Off	Off	Off	Off	Off	Fast Blinking red
-77 < RSS ≤ -70	Off	Off	Off	Off	Blinking green	Solid red
-70 < RSS ≤ -63	Off	Off	Off	Blinking green	Solid green	Solid red
-63 < RSS ≤ -56	Off	Off	Blinking green	Solid green	Solid green	Solid red
-56 < RSS ≤ -49	Off	Blinking green	Solid green	Solid green	Solid green	Solid red
-49 < RSS ≤ -42	Blinking green	Solid green	Solid green	Solid green	Solid green	Solid red
RSS < -42	Fast Blinking green	Solid green	Solid green	Solid green	Solid green	Solid red

Configuring Wireless AP LED Behavior

You can configure the behavior of the LEDs so that they provide the following information:

Table 3-6 LED Operational Modes

LED Mode	Information Displayed
Off	Displays fault patterns only. LEDs do not light when the AP is fault free and the discovery is complete.
Normal	Identifies the AP status during the registration process during power on and boot process.
Identify	All LEDs blink simultaneously approximately two to four times every second.
WDS Signal Strength	Indicates the WDS signal strength as a bar graph. See Table 3-5 for a description of LED behavior. This setting helps to align external antennas in WDS deployments by correlating the WDS link RSS with the LED pattern. Use this setting only if the AP operates in WDS mode by being a member of a WDS VNS.

You can configure the AP LED mode when you configure:

- An individual Wireless AP.
- Multiple Wireless APs simultaneously.
- Default Wireless AP behavior.

Note:
You can configure all four AP LED modes if you configure an individual Wireless AP or multiple Wireless APs simultaneously. If you configure the default
Wireless AP behavior, the only LED modes available are Off and Normal.

To Configure the AP LED Operational Mode When Configuring an Individual Wireless AP:

1. From the top menu, click **Wireless APs**. The Wireless AP screen displays.
2. In the left-hand pane, click **All APs**. The **AP Configuration** page displays with the **AP Properties** tab exposed.
3. In the second column from the left, select the appropriate AP.
4. On the **AP Properties** tab, click the **Advanced** button. The **Advanced** window displays.
5. In the **LED** field, click the arrow and select an LED operational mode. See Table 3-6 on page 3-14 for a description of each option.

To Set the AP LED Operational Mode When Using the AP Mulit-edit Feature:

1. From the top menu, click **Wireless APs**. The Wireless AP window displays.
2. In the left-hand pane, click **AP Multi-edit**. The **AP Multi-edit** window displays.
3. In the **Wireless AP** section, select one or more Wireless APs. The **AP Configuration** screen displays.
4. In the **AP Configuration** section, locate the LED field. Click the arrow and select an LED operational mode. See Table 3-6 on page 3-14 for a description of each option.

To Set the AP LED Operational Mode When Configuring Default AP Behavior:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. In the left pane, click **AP Default Settings**. The **AP Default Settings** page displays with the **Common Configuration** tab exposed.
3. Click the AP tab that corresponds to the type of AP that you want to configure. The **AP Properties** and **Radio** settings become available.
4. Click the **Advanced** button. The **Advanced** window displays.
5. In the **LED** field, click the arrow and select an LED operational mode. See Table 3-6 on page 3-14 for a description of each option.

Configuring the Wireless APs for the First Time

Before the Wireless AP is configured for the first time, you must first confirm that the following has already occurred:

- The SCALANCE IWLAN Controller has been set up. For more information, see Chapter 2, **Configuring the SCALANCE IWLAN Controller**.
- The SCALANCE IWLAN Controller has been configured. For more information, see Chapter 2, **Configuring the SCALANCE IWLAN Controller**.
- The Wireless APs have been installed.

For installation information, refer to the respective access point manual.

Once the installations are completed, you can then continue with the Wireless AP initial configuration. The Wireless AP initial configuration involves two steps:

1. Define parameters for the discovery process. For more information, see "Defining Properties for the Discovery Process" on page 3-16.

2. Connect the Wireless AP to a power source to initiate the discovery and registration process. For more information, see "Methods of Connecting and Powering a Wireless AP" on page 3-18.

Adding a Wireless AP Manually Option

You can manually add a Wireless AP to the SCALANCE IWLAN Controller, however, the AP must still go through the automatic discovery and registration process to locate the controller. The AP may skip the discovery process if it has a static list, or has previously connected and registered with the controller. For more information, see "Adding and Registering a Wireless AP Manually" on page 3-18.

Defining Properties for the Discovery Process

Before a Wireless AP is configured, you must define the following properties for the discovery process:

- Security Mode
- Discovery Timers

The discovery process is the process by which the Wireless APs determine the IP address of the SCALANCE IWLAN Controller.

Security Mode

Security mode defines how the SCALANCE IWLAN Controller behaves when registering new, unknown devices. During the registration process, the SCALANCE IWLAN Controller's approval of the Wireless AP's serial number depends on the security mode that has been set:

- **Allow all Wireless APs to connect**
  - If the SCALANCE IWLAN Controller does not recognize the registering serial number, a new registration record is automatically created for the AP (if within MDL license limit). The AP receives a default configuration. The default configuration can be the default template assignment.
  - If the SCALANCE IWLAN Controller recognizes the serial number, it indicates that the registering device is pre-registered with the controller. The controller uses the existing registration record to authenticate the AP and the existing configuration record to configure the AP.
- **Allow only approved Wireless APs to connect (this is also known as secure mode)**
  - If SCALANCE IWLAN Controller does not recognize the AP, the AP's registration record is created in pending state (if within MDL limits). The administrator is required to manually approve a pending AP for it to provide active service. The pending AP receives minimum configuration, which only allows it to maintain an active link with the controller for future state change. The AP's radios are not configured or enabled. Pending APs are not eligible for configuration operations (VNS Assignment, default template, Radio parameters) until approved.
  - If the SCALANCE IWLAN Controller recognizes the serial number, the controller uses the existing registration record to authenticate the AP. Following successful authentication, the AP is configured according to its stored configuration record.

Note:
During the initial setup of the network, Siemens recommends that you select the **Allow all** Wireless AP**s to connect** option. This option is the most efficient way to get a large number of Wireless APs registered with the SCALANCE IWLAN Controller.

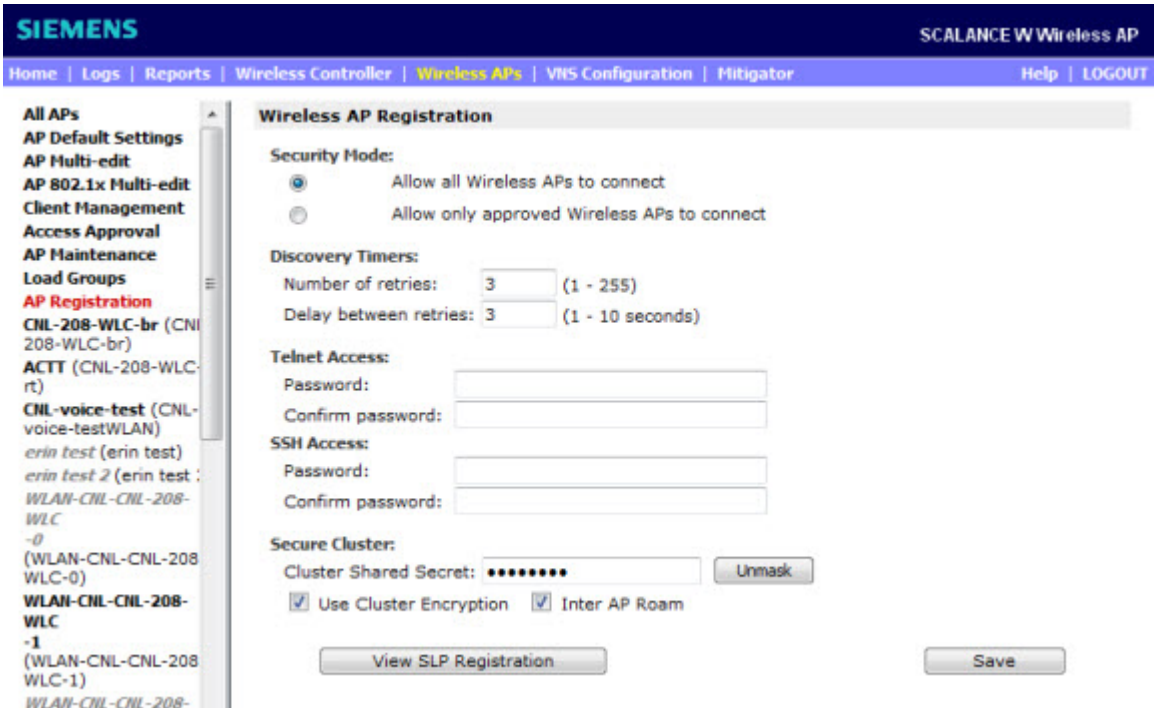
Once the initial setup is complete, Siemens recommends that you reset the security mode to the **Allow only approved** Wireless AP**s to connect** option. This option ensures that no unapproved Wireless APs are allowed to connect. For more information, see "Configuring Wireless AP Settings" on page 3-19.

Discovery Timers

The discovery timer parameters dictate the number of retry attempts and the time delay between each attempt.

To Define the Discovery Process Parameters:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. In the left pane, click **AP Registration**. The **Wireless AP Registration** screen is displayed.



3. In the **Security Mode** section, select one of the following:
   - **Allow all** Wireless AP**s to connect**
   - **Allow only approved Wireless APs to connect**

   The **Allow all** Wireless AP**s to connect** option is selected by default. For more information, see "Security Mode" on page 3-16.
4. In the **Discovery Timers** section, type the discovery timer values in the following boxes:
   - **Number of retries**
   - **Delay between retries**

The number of retries is limited to 255 for the discovery. The default number of retries is 3, and the default delay between retries is 3 seconds.

5. To save your changes, click **Save**.

Once the discovery parameters are defined, you can connect the Wireless AP to a power source.

Methods of Connecting and Powering a Wireless AP

When a Wireless AP is powered on, it automatically begins the discovery and registration process with the SCALANCE IWLAN Controller.

For methods of connecting and powering the Wireless AP refer to the corresponding AP manual.

Adding and Registering a Wireless AP Manually

You can manually add and register a Wireless AP to the controller, however, the AP must still go through the automatic discovery and registration process to locate the controller. The AP may skip the discovery process if it has a static list, or has previously connected and registered with the controller. When you manually add and register an AP, the system applies the default settings to the AP. After the system registers the AP, you can go in and edit its configuration settings. For more information, see Configuring Wireless AP Settings.

To add and register a Wireless AP manually:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.

   Regardless of the tab you click on, the Add Wireless Button displays at the bottom of the page.

2. Click the **Add Wireless AP** button.

   The **Add Wireless AP** screen displays.

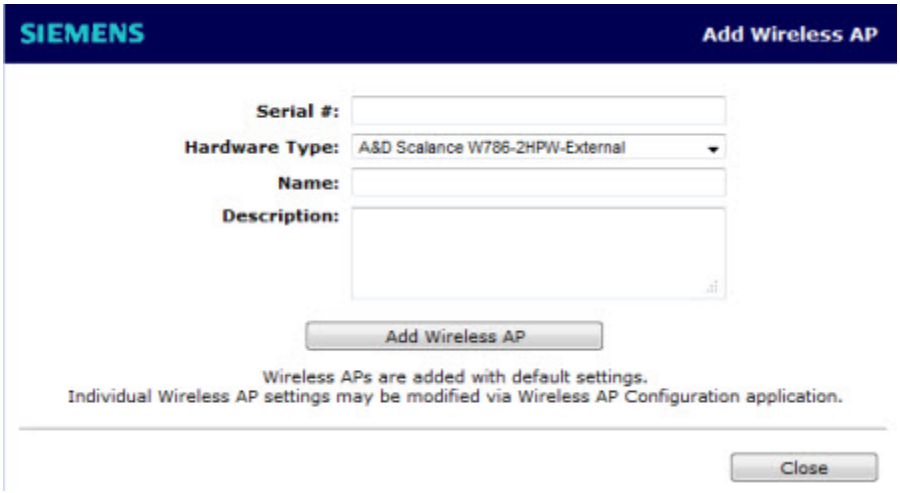


Table 3-7 Add Wireless AP window

Field	Description
Serial #	Type the Wireless AP's unique identifier.
Hardware Type	Select the hardware model of this AP from the drop-down menu

Table 3-7 Add Wireless AP window (continued)

Field	Description
Name	Type a unique name for the Wireless AP that identifies the access point. The default value is the Wireless AP's serial number.
Description	Enter a description of this AP.
Add Wireless AP	Click to add the Wireless AP with default settings. You can later modify these settings. When a Wireless AP is added manually, it is added to the controller database only and does not get assigned.
Close	Click to close this window.

Configuring Wireless AP Settings

Wireless APs are added with default settings, which you can adjust and configure according to your network requirements. In addition, you can modify the properties and the settings for each radio on the Wireless AP.

You can also locate and select Wireless APs in specific registration states to modify their settings. For example, this feature is useful when approving pending Wireless APs when there are a large number of other Wireless APs that are already registered. On the **Access Approval** screen, click **Pending** to select all pending Wireless APs, then click **Approve** to approve all selected Wireless APs.

Configuring Wireless AP settings can include the following processes:

- Modifying a Wireless AP's Status
- Configuring a Wireless AP's Properties
- Configuring Wireless AP Radio Properties
- Setting Up the Wireless AP Using Static Configuration
- Setting Up 802.1x Authentication for a Wireless AP

When configuring Wireless APs, you can choose to configure individual Wireless APs or simultaneously configure a group of Wireless APs. For more information, see "Configuring Multiple Wireless APs Simultaneously" on page 3-66.

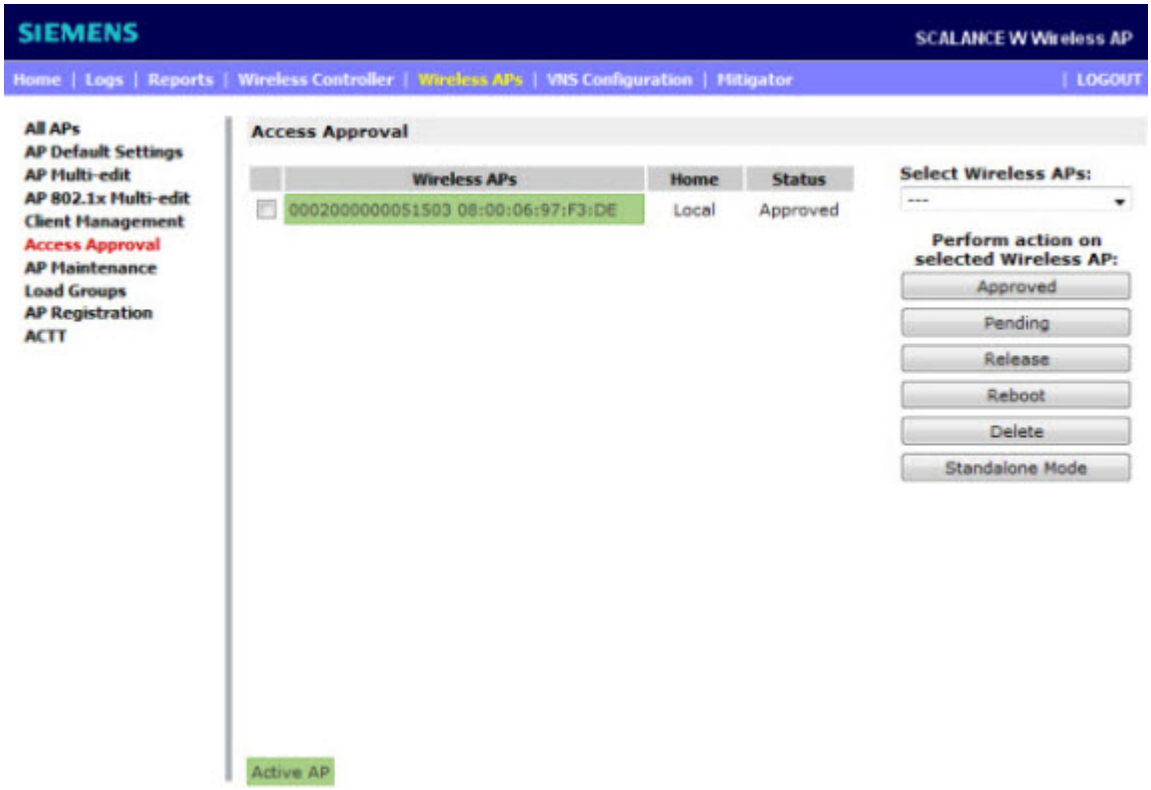
Modifying a Wireless AP's Status

If during the discovery process, the SCALANCE IWLAN Controller security mode was **Allow only approved Wireless APs to connect**, then the status of the Wireless AP is Pending. You must modify the security mode to **Allow all Wireless APs to connect**. For more information, see "Security Mode" on page 3-16.

To Modify a Wireless AP's Registration Status:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.

2. In the left pane, click **Access Approval**. The **Access Approval** screen is displayed, along with the registered Wireless APs and their status.



3. To select the Wireless APs for status change, do one of the following:
   - For a specific Wireless AP, select the corresponding checkbox.
   - For Wireless APs by category, click one of the **Select** Wireless AP**s** options.

   To clear your Wireless AP selections, click **Deselect All**.

4. Click the appropriate **Perform action on selected** Wireless AP**s** option:
   - **Approved** — Change a Wireless AP's status to **Approved** — a Wireless AP's status changes from **Pending** to **Approved** if the **AP Registration** screen was configured to register only approved Wireless APs.
   - **Pending** — AP is removed from the Active list, and is forced into discovery.
   - **Release** — Release foreign Wireless APs after recovery from a failover. Releasing an AP corresponds to the Availability functionality. For more information, see Chapter 12, **Availability and Session Availability**.
   - **Reboot** — Reboot the AP
   - **Delete** — Releases the Wireless AP from the SCALANCE IWLAN Controller and deletes the Wireless AP's entry in the SCALANCE IWLAN Controller's management database.
   - **Standalone Mode** — Standalone Mode is currently not supported by Siemens Wireless APs.

Configuring a Wireless AP's Properties

Once a Wireless AP has successfully registered, you can then continue to configure its properties. Configuring Wireless AP properties includes working with the following Wireless AP tabs:

- **AP Properties**
- **WLAN Assignment**
- **Radio 1**
- **Radio 2**
- **Static Configuration**
- **802.1x**

AP Properties Tab Configuration

Use the **AP Properties** tab to view and configure basic Wireless AP properties. Some of the Wireless AP properties can be viewed and configured via the **Advanced** dialog.

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. In the Wireless AP list, click the Wireless AP whose properties you want to modify. The **AP Properties** tab displays Wireless AP information.

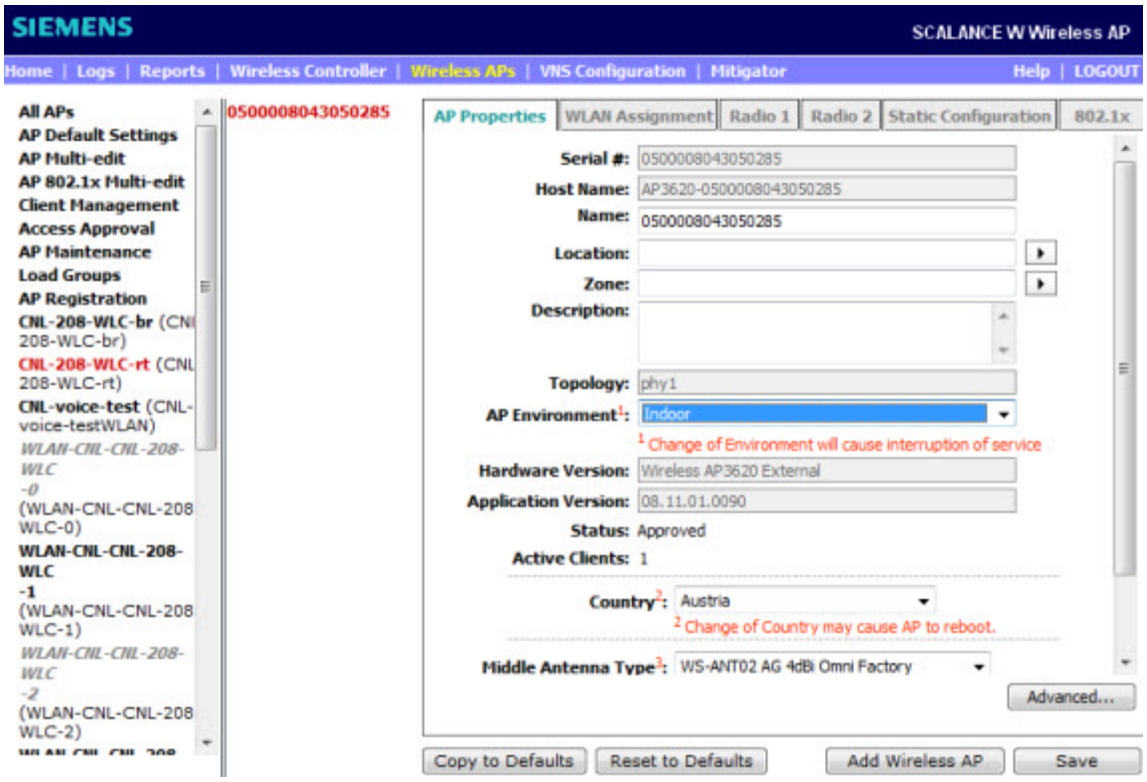


Table 3-8 AP Properties

Field	Description
Serial #	Read-only. Displays a unique identifier that is assigned during the manufacturing process.

Table 3-8 AP Properties (continued)

Field	Description
Host Name	Read-only. This value, which is based on AP Name, cannot be directly edited. This value depicts the AP Host-Name value. If the AP Name value does begin with a number, for example when it is the AP's serial number, the AP's model is prepended to the value. This value is used for tracking purposes on the DHCP server.
Name	Displays the Ethernet port of the SCALANCE IWLAN Controller to which the Wireless AP is connected.
Location	Define the location of the Wireless AP.
Zone	Select a (Policy) Zone for the specified AP. The Zone identifies the location-based policy.
Description	Type comments for the Wireless AP.
AP Environment	Click the Wireless AP's environment — **Indoor** or **Outdoor**. **Note:** The **AP Environment** drop-down is displayed on the **AP Properties** tab only if the selected Wireless AP is the Siemens Outdoor Wireless AP. The Siemens Outdoor Wireless AP can be deployed in both indoor and outdoor environments.
Topology	Read only. Displays the Topology name.
Hardware Version	Read-only. Displays the current version of the Wireless AP hardware.
Application Version	Read-only. Displays the current version of the Wireless AP software.
Status	**Approved** — Indicates that the Wireless AP has received its binding key from the SCALANCE IWLAN Controller after the discovery process. If no status is shown, that indicates that the Wireless AP has not yet successfully been approved for access with the secure SCALANCE IWLAN Controller. You can modify the status of a Wireless AP on the **Access Approval** screen. For more information, see "Modifying a Wireless AP's Status" on page 3-19.
Active Clients	Displays the number of wireless devices currently associated with the Wireless AP.
Country	Click the country of operation. This option is only available with some licenses. **Note:** The antenna you select determines the available channel list and the maximum transmitting power for the country in which the Wireless AP is deployed.
Middle Antenna Type	Click to select **No Antenna** or choose an antenna type from the drop-down list.
Left Antenna Type	Click to select **No Antenna** or choose an antenna type from the drop-down list.

Table 3-8 AP Properties (continued)

Field	Description
Right Antenna Type	Click to select **No Antenna** or choose an antenna type from the drop-down list.
Advanced Dialog	
Poll Timeout	Type the timeout value, in seconds, for the Wireless AP to re-establish the link with the SCALANCE IWLAN Controller if it (Wireless AP) does not get an answer to its polling. The default value is 10 seconds. **Note:** If you are configuring session availability, the **Poll Timeout** value should be 1.5 to 2 times the **Detect link failure** value on the **AP Properties** screen. For more information, see "Session Availability" on page 12-9.
Enable SSH Access	Click to enable or disable SSH for access to the Wireless AP. **Note:** The name of this field depends on type of Wireless AP that you have selected.
Enable Telnet Access	Click to enable or disable Telnet for access to the Wireless AP. **Note:** The name of this field depends on the type of Wireless AP that you have selected.
Enable Secure Tunnel	Click to Enable or Disable secure tunnel. This feature, when enabled, provides encryption, authentication, and key management for data traffic between the AP and/or controllers. **Note:** Secure tunnel can only be enabled when a V8.11 compatible AP is added to the network. Secure tunnel must be disabled for APs running previous versions.
Enable location-based-service	Enable or disable the AeroScout or Ekahau location-based service for the Wireless AP.
Maintain client session in event of poll failure	Select this option (if using a bridged at AP VNS) if the Wireless AP should remain active if a link loss with the controller occurs.This option is enabled by default.
Restart service in the absence of controller	Select this option (if using a bridged at AP VNS) to ensure the Wireless AP's radios continue providing service if the Wireless AP's connection to the SCALANCE IWLAN Controller is lost. If this option is enabled, it allows the Wireless AP to start a bridged at AP VNS even in the absence of a SCALANCE IWLAN Controller.
Use broadcast for disassociation	Select this option if you want the Wireless AP to use broadcast disassociation when disconnecting all clients, instead of disassociating each client one by one. This will affect the behavior of the Wireless AP under the following conditions: • If the Wireless AP is preparing to reboot or to enter one of the special modes (DRM initial channel selection). • If a BSSID is deactivated or removed on the Wireless AP. This option is disabled by default.

Table 3-8 AP Properties (continued)

Field	Description
Enable LLDP	Click to enable or disable the Wireless AP from broadcasting LLDP information. This option is disabled by default. If SNMP is enabled on the SCALANCE IWLAN Controller and you enable LLDP, the **LLDP Confirmation** dialog is displayed. Select one of the following: **Proceed (not recommended)** — Select this option to enable LLDP and keep SNMP running, and then click **OK**. **Disable SNMP publishing, and proceed** — Select this option to enable LLDP and disable SNMP, and then click **OK**. For more information on enabling SNMP, see the SCALANCE WLC711 *Maintenance Guide*.
Announcement Interval	If LLDP is enabled, type how often the Wireless AP advertises its information by sending a new LLDP packet. This value is measured in seconds. If there are no changes to the Wireless AP configuration that impact the LLDP information, the Wireless AP sends a new LLDP packet according to this schedule. **Note:** The **Time to Live** value cannot be directly edited. The **Time to Live** value is calculated as four times the **Announcement Interval** value.
Announcement Delay	If LLDP is enabled, type the announcement delay. This value is measured in seconds. If a change to the Wireless AP configuration occurs which impacts the LLDP information, the Wireless AP sends an updated LLDP packet. The announcement delay is the length of time that delays the new packet delivery. The announcement delay helps minimize LLDP packet traffic.
Real Capture	Click **Start** to start real capture server on the AP. This feature can be enabled for each AP individually. Statistics are captured using an external connection to a Windows WireShark client. In Wireshark, by selecting the remote APs' IP address and null authentication, the wired and enabled wireless interfaces are listed as available for capture. Default capture server timeout is set to 300 seconds and the maximum configurable timeout is 1 hour. Capture statistics are found on the Active Wireless APs report (see Viewing Statistics for APs).

Assigning Wireless AP Radios to a VNS

There are three methods of assigning Wireless AP radios to a VNS:

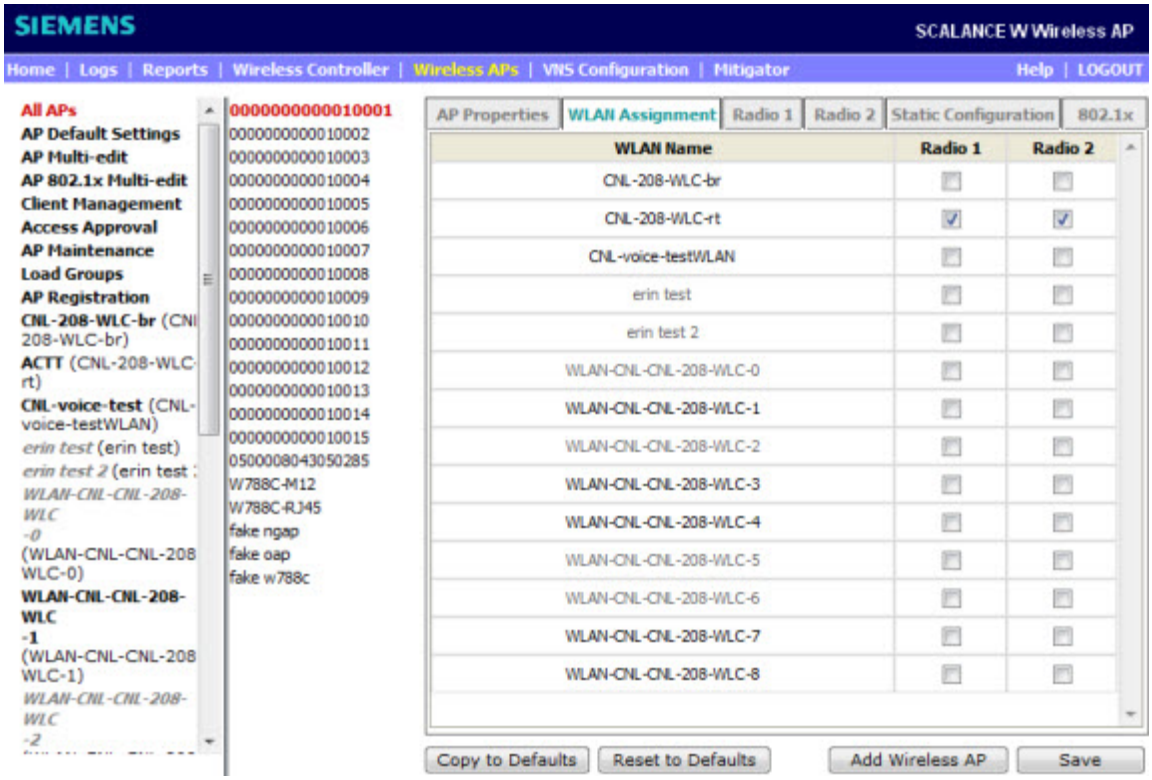
- **VNS configuration** — When a VNS is configured, you can assign Wireless AP radios to the VNS through its associated WLAN Service. For more information, see "Configuring WLAN Services" on page 6-1.

Note:
To configure foreign Wireless AP radios to a VNS, use the VNS configuration method. Foreign Wireless APs are only listed and available for VNS assignment from the **WLAN Services** tab. For more information, see Chapter 7, **Configuring a VNS**.

- **AP Multi-edit** — When you configure multiple Wireless APs simultaneously, you can use the AP Multi-edit feature. For more information, see "Configuring Multiple Wireless APs Simultaneously" on page 3-66.
- Wireless AP **configuration** — When you configure an individual Wireless AP, you can assign its radios to a specific WLAN Service.

To Assign Wireless AP Radios When Configuring an Individual Wireless AP:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. Click the appropriate Wireless AP in the list. The **AP Properties** tab is displayed.
3. Click the **WLAN Assignment** tab.



4. In the **Radio 1** and **Radio 2** columns, select the Wireless AP radios that you want to assign for each WLAN Service.
5. To save your changes, click **Save**.

Configuring Wireless AP Radio Properties

Modifying Wireless AP radio properties can vary significantly depending on the model of the Wireless AP your are configuring:

- For specific information on modifying a Wireless 802.11n AP, see "Modifying Wireless 802.11n AP W786C/W788C Radio Properties" on page 3-27.
- For specific information on modifying a W786-2HPW, see "Modifying Wireless AP W786-2HPW Radio Properties" on page 3-39.

Dynamic Radio Management (DRM)

When you modify a Wireless AP's radio properties, the Dynamic Radio Management (DRM) functionality of the SCALANCE IWLAN Controller can be used to help establish the optimum radio configuration for your Wireless APs. DRM is enabled by default. The SCALANCE IWLAN Controller's DRM:

- Adjusts transmit power levels to balance coverage between Wireless APs assigned to the same RF domain and operating on the same channel.
- Scans and coordinates with other Wireless APs to select an optimal operating channel.

The DRM feature consists of three functions:

- **Auto Channel Selection (ACS)** — ACS provides an easy way to optimize channel arrangement based on the current situation in the field. ACS provides an optimal solution only if it is triggered on all Wireless APs in a deployment. Triggering ACS on a single Wireless AP or on a subset of Wireless APs provides a useful but suboptimal solution. Also, ACS only relies on the information observed at the time it is triggered. Once a Wireless AP has selected a channel, it will remain operating on that channel until the user changes the channel or triggers ACS.

  ACS can be triggered by one of the following events:

  – A new Wireless AP registers with the SCALANCE IWLAN Controller and the **AP Default Settings** channel is **Auto**.

  – A user selects **Auto** from the **Request New Channel** drop-down list on the Wireless AP's radio configuration tabs.

  – A user selects **Auto** from the **Channel** drop-down list on the **AP Multi-edit** screen.

  – If Dynamic Channel Selection (DCS) is enabled in active mode and a DCS threshold is exceeded.

  – A Wireless AP detects radar on its current operating channel and it employs ACS to select a new channel.

  – **Channel Plan** — If ACS is enabled, you can define a channel plan for the Wireless AP. Defining a channel plan allows you to limit which channels are available for use during an ACS scan. For example, you may want to avoid using specific channels because of low power, regulatory domain, or radar interference. Select from the following options:

    Depending on the radio used, when defining a channel plan you can either create your customized channel plan by selecting individual channels or you can select a default 3 or 4 channel plan.

    You can use the channel plan to avoid transmission overlap on 40MHz channels of the Wireless 802.11n APs. To avoid channel overlap between Wireless 802.11n APs that operate on 40MHz channels, configure the channel plan for the 5 GHz radio band to use every other channel available.

If using half of the available channels is not an option for your environment, do not configure a channel plan. Instead, allow ACS to select from all available channels. This alternate solution may contribute to increased congestion on the extension channels.

Note:
ACS in the 2.4GHz radio band with 40MHz channels is not recommended due to severe co-channel interference.

- **Dynamic Channel Selection (DCS)** — DCS allows a Wireless AP to monitor traffic and noise levels on the channel on which the Wireless AP is currently operating. DCS can operate in two modes:
  - **Monitor** — When DCS is enabled in monitor mode and traffic or noise levels exceed the configured DCS thresholds, an alarm is triggered and an information log is generated. The DCS monitor alarm is used for evaluating the RF environment of your deployed Wireless APs.
  - **Active** — When DCS is enabled in active mode and traffic or noise levels exceed the configured DCS thresholds, an alarm is triggered and an information log is generated. In addition, the Wireless AP will cease operating on the current channel and ACS will be employed to select an alternate channel for the Wireless AP to operate on. DCS will not trigger channel changes on neighboring Wireless APs.

Note:
If DCS is enabled, DCS statistics can be viewed in the **Wireless Statistics by Wireless APs** display. For more information, see Chapter 16, **Working with Reports and Statistics**.

- **Auto Tx Power Control (ATPC)** — ATPC guarantees your LAN a stable RF environment by automatically adapting transmission power signals according to the coverage provided by the Wireless APs. ATPC can be either enabled or disabled.

  When you disable ATPC, you are given the option of automatically adjusting the Max Tx Power setting to match the Current Tx Power Level. In the case of AP Multi-edit, if you reply yes, then each individual Wireless AP's Max Tx Power setting will be adjusted to correspond with its Current Tx Power Level in the database.

Modifying Wireless 802.11n AP W786C/W788C Radio Properties

The following section describes how to modify a Wireless 802.11n AP.

For information on how to modify a SCALANCE W786-2HPW, see “Modifying Wireless AP W786-2HPW Radio Properties” on page 3-39.

Channel Bonding

Channel bonding improves the effective throughput of the wireless LAN. In contrast to the Wireless AP W786-2HPW which uses radio channel spacings that are only 20MHz wide, the Wireless 802.11n AP can use two channels at the same time to create a 40MHz wide channel. To achieve a 40MHz channel width, the Wireless 802.11n AP employs channel bonding — two 20MHz channels at the same time.

The 40MHz channel width is achieved by bonding the primary channel (20MHz) with an extension channel that is either 20MHz above (bonding up) or 20MHz below (bonding down) of the primary channel.

Depending on the **Radio**, channel bonding can be predefined:

- **Radio 1** — Bonding pairs are predefined.

- **Radio 2** — Channels can bond up or down as long as the band edge is not exceeded, but some channels have predefined bonding directions.

Channel bonding is enabled by selecting the **Channel Width** on the **Radio** tabs. When selecting **Channel Width**, the following options are available:

- **20MHz** — Channel bonding is not enabled:
  - 802.11n clients use the primary channel (20MHz)
  - Non-802.11n clients, as well as beacons and multicasts, use the 802.11a/b/g radio protocols.
- **40MHz** — Channel bonding is enabled:
  - 802.11n clients that support the 40MHz frequency can use 40MHz, 20MHz, or the 802.11a/b/g radio protocols.
  - 802.11n clients that do not support the 40MHz frequency can use 20MHz or the 802.11a/b/g radio protocols.
  - Non-802.11n clients, beacons, and multicasts use the 802.11a/b/g radio protocols.
  - If the primary channel allows for both bonding types (up and down), you can select the channel bonding type from the **Channel Bonding** drop-down list.
  - If the primary channel allows for only one of the bonding types (up or down), that channel bond type is displayed in the **Channel Bonding** drop-down list.
- **Auto** — Channel bonding is automatically enabled or disabled, switching between 20MHz and 40MHz, depending on how busy the extension channel is. If the extension channel is busy above a prescribed threshold percentage, which is defined in the **40MHz Channel Busy Threshold** box, channel bonding is disabled.

Channel Selection — Primary and Extension

The primary channel of the Wireless 802.11n AP is selected from the **Request New Channel** drop-down list. If **auto** is selected, the ACS feature selects the primary channel. Depending on the primary channel that is selected, channel bonding may be allowed: up or down.

Guard Interval

The guard intervals ensure that individual transmissions do not interfere with one another. The Wireless 802.11n AP provides a shorter guard interval that increases the channel throughput. When a 40MHz channel is used, you can select the guard interval to improve the channel efficiency. The guard interval is selected from the **Guard Interval** drop-down list. Longer guard periods reduce the channel efficiency.

Aggregate MSDU and MPDU

The Wireless 802.11n AP provides aggregate Mac Service Data Unit (MSDU) and aggregate Mac Protocol Data Unit (MPDU) functionality, which combines multiple frames together into one larger frame for a single delivery. This aggregation reduces the overhead of the transmission and results in increased throughput. The aggregate methods are enabled and defined selected from the **Aggregate MSDUs** and **Aggregate MPDUs** drop-down lists.

Antenna Selection

The W786C / W788C APs have 6 antennas: top left, middle, right and bottom left, middle, right.

The top antennas are connected to Radio 1; the bottom antennas are connected to Radio 2. For details refer to the manual of your respective AP.

The Wireless 802.11n AP is configured, by default, to transmit on all three antennas. Depending on your deployment requirements, you can configure the Wireless 802.11n AP to transmit on specific antennas. You can configure the Wireless 802.11n AP to transmit on specific antennas for both radios, including all the available modes:

- **Radio 1** — a, a/n modes
- **Radio 2** — b, b/g, b/g/n modes

When you configure the Wireless 802.11n AP to use specific antennas, the following occurs:

- Transmission power is recalculated — The **Current Tx Power Level** value for the radio is automatically adjusted to reflect the recent antenna configuration. It takes approximately 30 seconds for the change to the **Current Tx Power Level** value to be reflected in the SCALANCE W Wireless Assistant.
- Radio is reset — The radio is reset causing client connections on this radio to be lost.

To Modify Wireless 802.11n AP Radio Properties:

1. From the top menu, click **Wireless APs**. The Siemens Wireless AP screen is displayed.
2. Click the appropriate Wireless 802.11n AP in the list. The **AP Properties** tab is displayed.
3. Click the **Radio** tab you want to modify.

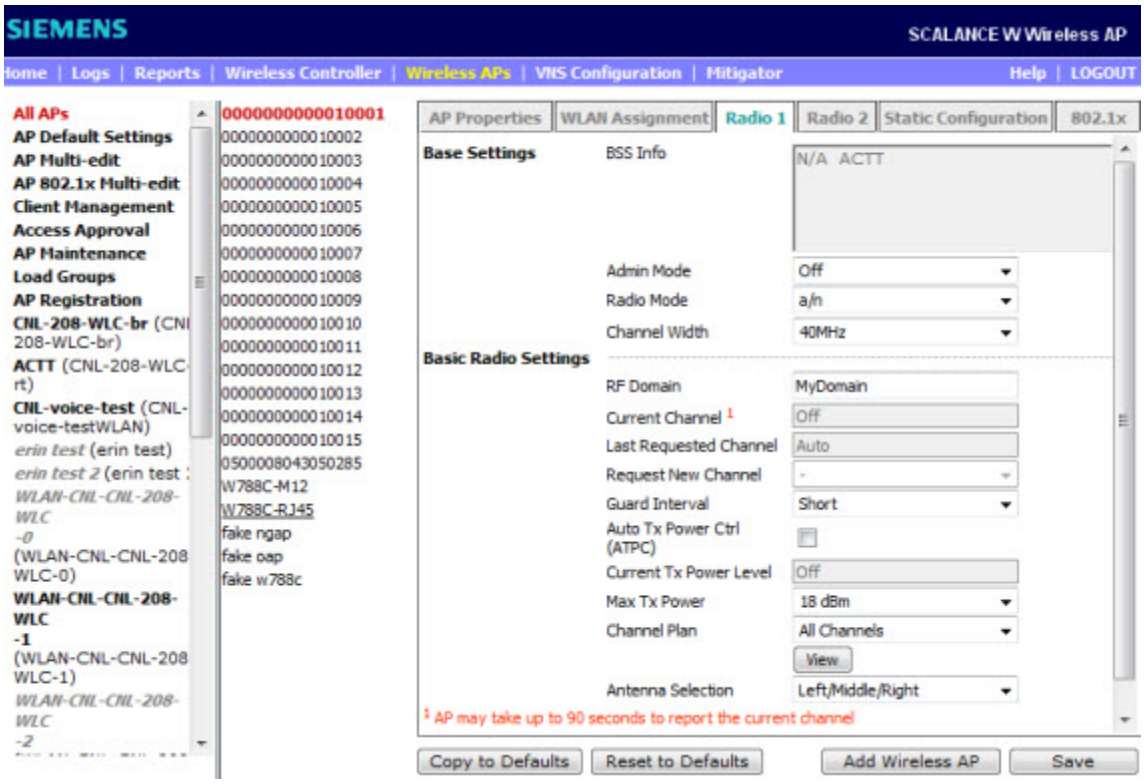


Table 3-9 Radio Properties

Field	Description
Base Settings	
BSS Info	BSS Info is read-only. After WLAN Service configuration, the Basic Service Set (BSS) section displays the MAC address on the Wireless AP for each WLAN Service and the SSIDs of the WLAN Services to which this radio has been assigned.
Admin Mode	Select On to enable the radio; select Off to disable the radio.
Radio Mode - Radio 1	Click one of the following radio options for Radio 1: **a** — Click to enable the 802.11a mode of Radio 1 without 802.11n capability. **a/n** — Click to enable the 802.11a mode of Radio 1 with 802.11n capability. **n-strict** — Click to enable the 802.11a mode of Radio 1 with 802.11n strict capability. **Note:** Depending on the radio modes you select, some of the radio settings may not be available for configuration. The Wireless AP hardware version dictates the available radio modes.
Radio Mode - Radio 2	Click one of the following radio options for Radio 2: **b** — Click to enable the 802.11b-only mode of **Radio 2**. If selected, the AP will use only 11b (CCK) rates with all associated clients. **g** — Click to enable the 802.11g-only mode of **Radio 2**. **b/g** — Click to enable both the 802.11g mode and the 802.11b mode of **Radio 2**. If selected, the AP will use 11b (CCK) and 11g-specific (OFDM) rates with all of the associated clients. The AP will not transmit or receive 11n rates. **g/n** — Click to enable both the 802.11g mode and the 802.11nb mode of **Radio 2**. If selected, the AP will use 11n and 11g-specific (OFDM) rates with all of the associated clients. The AP will not transmit or receive 11b rates. **b/g/n** — Click to enable b/g/n modes of **Radio 2**. If selected, the AP will use all available 11b, 11g, and 11n rates. **n-strict** — Click to enable the 802.11n-strict mode of **Radio 2**. If selected, the AP can be configured to use 11n-strict rates with all of the associated clients. The AP will not transmit or receive 11b or 11g rates. **Note:** Depending on the radio modes you select, some of the radio settings may not be available for configuration.
Basic Radio Settings	
RF Domain	Type a string that uniquely identifies a group of APs that cooperate in managing RF channels and transmission power levels. The maximum length of the string is 16 characters. The RF Domain is used to identify a group of Wireless APs. The RF Domain feature is part of the Auto Tx Power Control (ATPC) feature (for more information, see “Configuring Wireless AP Radio Properties” on page 3-26).

Table 3-9 Radio Properties (continued)

Field	Description
Current Channel	Read-only. The actual channel the ACS has assigned to the Wireless AP radio. The Current Channel value and the Last Requested Channel value may be different because the ACS automatically assigns the best available channel to the Wireless AP, ensuring that a Wireless AP's radio is always operating on the best available channel.
Last Requested Channel	Read-only. The last wireless channel that you had selected to communicate with the wireless devices.
Request New Channel	Click the wireless channel you want the Wireless AP to use to communicate with wireless devices. Click **Auto** to request the ACS to search for a new channel for the Wireless AP, using a channel selection algorithm. This forces the Wireless AP to go through the auto-channel selection process again. **Note:** ACS in the 2.4GHz radio band with 40MHz channels is not recommended due to severe co-channel interference. Depending on the regulatory domain (based on country), some channels may be restricted. The default value is based on North America. For more information, see Appendix B.
Auto Tx Power Ctrl (ATPC)	Select to enable ATPC. ATPC automatically adapts transmission power signals according to the coverage provided by the Wireless APs. After a period of time, the system will stabilize itself based on the RF coverage of your Wireless APs. The APs should be part of the same RF Domain to function properly. **Note:** If you disable ATPC, you can still choose to maintain using the current Tx power setting ATPC had established. If you elect to maintain using the ATPC power setting, the displayed **Current Tx Power Level** value becomes the new **Max Tx Power** value for the Wireless AP.
Current Tx Power Level	The actual Tx power level used by the Wireless AP radio.
Max Tx Power	Click the maximum Tx power level to which the range of transmit power can be adjusted: **0** to **24 dBm**. Siemens recommends that you select **24 dBm** to use the entire range of potential Tx power. **Note:** In reality, the lowest achievable power level is 5 dBm for the Wireless 802.11n APs. If you assign a lower value, it will automatically default to the lowest achievable level.
Min Tx Power	If ATPC is enabled, click the minimum Tx power level to which the range of transmit power can be adjusted. Siemens recommends that you select the lowest value available to use the entire range of potential Tx power. **Note:** The **Minimum Tx Power** level is subject to the regulatory compliance requirement for the selected country.

Table 3-9 Radio Properties (continued)

Field	Description
Auto Tx Power Ctrl Adjust	If ATPC is enabled, click the Tx power level that can be used to adjust the ATPC power levels that the system has assigned. Siemens recommends that you to use **0 dB** during your initial configuration. If you have an RF plan that recommended Tx power levels for each Wireless AP, compare the actual Tx power levels your system has assigned against the recommended values your RF plan has provided. Use the **Auto Tx Power Ctrl Adjust** value to achieve the recommended values.
Channel Plan - Radio 1	If ACS is enabled, you can define a channel plan for the Wireless AP. Defining a channel plan allows you to limit which channels are available for use during an ACS scan. For example, you may want to avoid using specific channels because of low power, regulatory domain, or radar interference. Click one of the following: **All channels** — ACS scans all channels for an operating channel and returns both DFS and non-DFS channels, if available. **All Non-DFS Channels** — ACS scans all non-DFS channels for an operating channel. This selection is always available, but if there are no DFS Channels available, the list is the same as the All Channels list. **Custom** — To configure individual channels from which the ACS will select an operating channel, click **Configure**. The **Custom Channel Plan** dialog displays. By default, all channels participate in the channel plan. Click the individual channels you want to include in the channel plan. To select contiguous channels, use the Shift key. To select multiple, non-contiguous channels in the list, use the CTRL key. Click **OK** to save the configuration.
Channel Plan - Radio 2	If ACS is enabled, you can define a channel plan for the Wireless AP. Defining a channel plan allows you to limit which channels are available for use during an ACS scan. For example, you may want to avoid using specific channels because of low power, regulatory domain, or radar interference. Click one of the following: **3 Channel Plan** — ACS will scan the following channels: **1**, **6**, and **11** in North America, and **1**, **7**, and **13** in most other parts of the world. **4 Channel Plan** — ACS will scan the following channels: **1**, **4**, **7**, and **11** in North America, and **1**, **5**, **9**, and **13** in most other parts of the world. **Auto** — ACS will scan the default channel plan channels: **1**, **6**, and **11** in North America, and **1**, **5**, **9**, and **13** in most other parts of the world. **Custom** — If you want to configure individual channels from which the ACS will select an operating channel, click **Configure**. The **Add Channels** dialog is displayed. Click the individual channels you want to add to the channel plan while pressing the CTRL key, and then click **OK**.

Table 3-9 Radio Properties (continued)

Field	Description
Antenna Selection	Click the antenna, or antenna combination, you want to configure on this radio. **Note:** When you configure the Wireless 802.11n AP to use specific antennas, the transmission power is recalculated; the **Current Tx Power Level** value for the radio is automatically adjusted to reflect the recent antenna configuration. It takes approximately 30 seconds for the change to the **Current Tx Power Level** value to be reflected in the SCALANCE W Wireless Assistant. Also, the radio is reset which may cause client connections on this radio to be lost.
Advanced Dialog - Base Settings	
DTIM period	Type the desired DTIM (Delivery Traffic Indication Message) period — the number of beacon intervals between two DTIM beacons. To ensure the best client power savings, use a large number. Use a small number to minimize broadcast and multicast delay. The default value is **5**.
Beacon Period	Type the desired time, in milliseconds, between beacon transmissions. The default value is **100** milliseconds.
RTS/CTS Threshold	Type the packet size threshold, in bytes, above which the packet will be preceded by an RTS/CTS (Request to Send/Clear to Send) handshake. The default value is **2346**, which means all packets are sent without RTS/CTS. Reduce this value only if necessary.
Frag. Threshold	Type the fragment size threshold, in bytes, above which the packets will be fragmented by the Wireless AP prior to transmission. The default value is **2346**, which means all packets are sent unfragmented. Reduce this value only if necessary.
Max % of non-unicast traffic per Beacon period	Enter the maximum percentage of time that the AP will transmit non-unicast packets (broadcast and multicast traffic) for each configured Beacon Period. For each non-unicast packet transmitted, the system calculates the airtime used by each packet and drops all packets that exceed the configured maximum percentage. By restricting non-unicast traffic, you limit the impact of broadcasts and multicasts on overall system performance.
Maximum Distance	Enter a value from 100 to 15,000 meters that identifies the maximum link distance between APs that participate in a WDS. This value ensures that the acknowledgement of communication between APs does not exceed the timeout value predefined by the 802.11 standard. The default value is 100 meters. If the link distance between APs is greater than 100 meters, configure the maximum distance up to 15,000 meters so that the software increases the timeout value proportionally with the distance between APs. Do not change the default setting for the radio that provides service to 802.11 clients only.

Table 3-9 Radio Properties (continued)

Field	Description
Advanced Dialog - Basic Radio Settings	
Dynamic Channel Selection	To enable Dynamic Channel Selection, click one of the following: **Off** — Disables the feature **Monitor Mode** — If enabled, a selection of DCS Interference Events appears in a separate dialog. If traffic or noise levels exceed the configured DCS thresholds, an alarm is triggered and an information log is generated. **Active Mode** — If enabled, a selection of DCS Interference Events appears in a separate dialog. If traffic or noise levels exceed the configured DCS thresholds, an alarm is triggered and an information log is generated. In addition, the Wireless AP will cease operating on the current channel and ACS is employed to automatically select an alternate channel for the Wireless AP to operate on.
DCS Noise Threshold	Type the noise interference level, measured in dBm, after which ACS will scan for a new operating channel for the Wireless AP if the threshold is exceeded.
DCS Channel Occupancy Threshold	Type the channel utilization level, measured as a percentage, after which ACS will scan for a new operating channel for the Wireless AP if the threshold is exceeded.
DCS Update Period	Type the time, measured in minutes that determines the period during which the Wireless AP averages the **DCS Noise Threshold** and **DCS Channel Occupancy Threshold** measurements. If either one of these thresholds is exceeded, then the Wireless AP will trigger **ACS**.
DCS Interference Event (appears if Dynamic Channel Selection is enabled)	Enable or disable the following DCS Events: • Bluetooth • Microwave • Cordless Phone • Constant Wave • Video Bridge Interference Wait Time: Length of the delay (in seconds) before logging an alarm. Default setting is 10 seconds.
Protection Mode	Click a protection mode: **None**, **Auto**, or **Always**. The default and recommended setting is **Auto**. Click **None** if 11b APs and clients are not expected. Click **Always** if you expect many 11b-only clients.
Protection Type	Click a protection type, **CTS Only** or **RTS- CTS**, when a 40MHz channel is used. This protects high throughput transmissions on extension channels from interference from non-11n APs and clients.
Min. Basic Rate	Click the minimum data rate that must be supported by all stations in a BSS: **6**, **12**, or **24** Mbps. If necessary, the **Max Basic Rate** choices adjust automatically to be higher or equal to the **Min Basic Rate**.

Table 3-9 Radio Properties (continued)

Field	Description
Max Basic Rate	Click the maximum data rate that must be supported by all stations in a BSS: **6**, **12**, or **24** Mbps. If necessary, the **Max Basic Rate** choices adjust automatically to be higher or equal to the **Min Basic Rate**.
Max Operational Rate	Click the maximum data rate that clients can operate at while associated with the Wireless AP: **24**, **36**, **48**, or **54** Mbps. If necessary, the **Max Operational Rate** choices adjust automatically to be higher or equal to the **Max Basic Rate**.
Rx Diversity	Click **Best** for the best signal from both antennas, or **Left** or **Right** to choose either of the two diversity antennas. The default and recommended selection is **Best**. If only one antennae is connected, use the corresponding **Left** or **Right** diversity setting. Do not use **Best** if two identical antennas are not used.
Tx Diversity	Click **Alternate** for the best signal from both antennas, or **Left** or **Right** to choose either of the two diversity antennas. The default selection is **Alternate** that maximizes performance for most clients. However, some clients may behave oddly with Tx Diversity set to **Alternate**. Under those circumstances, Siemens recommends that you use either **Left** or **Right** for Tx Diversity. If only one antennae is connected, use the corresponding **Left** or **Right** diversity setting. Do not use **Alternate** if two identical antennas are not used.
Total # of Retries for Background BK	Click the number of retries for the Background transmission queue. The default value is **adaptive (multi-rate)**. The recommended setting is **adaptive (multi-rate)**.
Total # of Retries for Best Effort BE	Click the number of retries for the Best Effort transmission queue. The default value is **adaptive (multi-rate)**. The recommended setting is **adaptive (multi-rate)**.
Total # of Retries for Video VI	Click the number of retries for the Video transmission queue. The default value is **adaptive (multi-rate)**. The recommended setting is **adaptive (multi-rate)**.
Total # of Retries for Voice VO	Click the number of retries for the Voice transmission queue. The default value is **adaptive (multi-rate)**. The recommended setting is **adaptive (multi-rate)**.
Total # of Retries for Turbo Voice TVO	Click the number of retries for the Turbo Voice transmission queue. The default value is **adaptive (multi-rate)**. The recommended setting is **adaptive (multi-rate)**.
Advanced Dialog - 11n Settings	
Protection Mode	Click a protection mode: None, Auto, or Always. The default and recommended setting is Auto. Click None if 11b APs and clients are not expected. Click Always if you expect many 11b-only clients.
Protection Type	Click a protection type, CTS Only or RTS- CTS, when a 40MHz channel is used. This protects high throughput transmissions on extension channels from interference from non-11n APs and clients.

Table 3-9 Radio Properties (continued)

Field	Description
40MHz Channel Busy Threshold	Type the extension channel threshold percentage, which if exceeded, will disable transmissions on the extension channel (40MHz).
40MHz Prot. Channel Offset	Select a 20MHz channel offset if the deployment is using channels that are 20MHz apart (for example, using channels **1**, **5**, **9**, and **13**) or a 25MHz channel offset if the deployment is using channels that are 25MHz apart (for example, using channels **1**, **6**, and **11**).
Aggregate MSDUs	Click an aggregate MSDU mode: Enabled or Disabled. Aggregate MSDU increases the maximum frame transmission size.
Aggregate MPDUs	Click an aggregate MPDU mode: Enabled or Disabled. Aggregate MPDU provides a significant improvement in throughput.
Aggregate MPDU Max Length	Type the maximum length of the aggregate MPDU. The value range is 1024-65535 bytes.
Agg. MPDU Max # of Sub-frames	Type the maximum number of sub-frames of the aggregate MPDU. The value range is 2-64.
ADDBA Support	Click an ADDBA support mode: Enabled or Disabled. ADDBA, or block acknowledgement, provides acknowledgement of a group of frames instead of a single frame. ADDBA Support must be enabled if Aggregate APDU is enable.
LDPC	Click an LDPC mode: Enabled or Disabled. LDPC increases the reliability of the transmission resulting in a 2dB increased performance compared to traditional 11n coding.
STBC	Click an STBC mode: Enabled or Disabled. STBC is a simple open loop transmit diversity scheme. When enabled, STBC configuration is 2x1 (one spatial stream split into two space-time streams). TXBF will override STBC if both are enabled for single stream rates.
TXBF	Click an TXBF mode: Enabled or Disabled. Tx Beam Forming focuses transmission beams directly at the intended receiver while reducing the overall interference generated by the transmitter.
Advanced Dialog - 11b Settings	
Preamble	Click a preamble type for 11b-specific (CCK) rates: **Short** or **Long**. Click **Short** if you are sure that there is no pre-11b AP or a client in the vicinity of this Wireless 802.11n AP. Click **Long** if compatibility with pre-11b clients is required.
Advanced Dialog - 11g Settings	
Protection Mode	Click a protection mode: **None**, **Auto**, or **Always**. The default and recommended setting is **Auto**. Click **None** if 11b APs and clients are not expected. Click **Always** if you expect many 11b-only clients.
Protection Rate	Click a protection rate: **1**, **2**, **5.5**, or **11** Mbps. The default and recommended setting is **11**. Only reduce the rate if there are many 11b clients in the environment or if the deployment has areas with poor coverage. For example, rates lower than **11** Mbps are required to ensure coverage.

Table 3-9 Radio Properties (continued)

Field	Description
Protection Type	Click a protection type: **CTS Only** or **RTS CTS**. The default and recommended setting is **CTS Only**. Click **RTS CTS** only if an 11b AP that operates on the same channel is detected in the neighborhood, or if there are many 11b-only clients in the environment. **Note:** The overall throughput is reduced when **Protection Mode** is enabled, due to the additional overhead caused by the RTS/CTS. The overhead is minimized by setting **Protection Type** to **CTS Only** and **Protection Rate** to **11** Mbps. The overhead causes the overall throughput to be sometimes lower than if just 11b mode is used. If there are many 11b clients, Siemens recommends that you disable 11g support (11g clients are backward compatible with 11b APs). An alternate approach, although potentially a more expensive method, is to dedicate all APs on a channel for 11b (for example, disable 11g on these APs) and disable 11b on all other APs. The difficulty with this method is that the number of APs must be increased to ensure coverage separately for 11b and 11g clients.

Achieving High Throughput with the Wireless 802.11n AP

To achieve link rates of up to 450Mbps with the Wireless 802.11n AP, configure your system as described in the following section.

Note:
Maximum throughput cannot be achieved if both 802.11n and legacy client devices are to be supported.

Note:
Some client devices will choose a 2.4GHz radio even when a 5GHz high-speed radio network is available; you may need to force those client devices to use only 5GHz if you have configured high throughput only on the 5GHz radio.

To Achieve High Throughput with the Wireless 802.11n AP:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. In the Wireless AP list, click the Wireless 802.11n AP you want to configure.
3. Click the **Radio 2** tab, and then do the following:
   - In the **Radio Mode** drop-down list, click **b/g/n**.
   - In the **Channel Width** drop-down list, click **40MHz**.

Note:
Some client devices do not support 40MHz in b/g/n mode. To accommodate these clients, you must enable **a/n** mode on the **Radio 1** tab. Otherwise, the client device will connect at only 130Mbps.

   - In the **Guard Interval** drop-down list, click **Short**.
   - In the **11g Settings** section, click **None** in the **Protection Mode** drop-down list.

Note:
Do not disable 802.11g protection mode if you have 802.11b or 802.11g client devices using this Wireless AP; instead, configure only **Radio 1** for high throughput unless it is acceptable to achieve less than maximum 802.11n throughput on **Radio 2**.

- If only 802.11n devices are present, you must disable 11n protection and 40MHz protection:
  - **Protection Mode** — Click **None**.
  - **Protection Type** — Click **CTS only** or **RTS CTS**.

Note:
Do not disable 802.11n protection mode if you have 802.11b or 802.11g client devices using this Wireless AP; instead, configure only **Radio 1** for high throughput unless it is acceptable to achieve less than maximum 802.11n throughput on **Radio 2**.

- **Aggregate MSDUs** — Click **Enabled**.
- **Aggregate MPDU** — Click **Enabled**.
- **Aggregate MPDU Max Length** — Click **65535**
- **Agg. MPDU Max # of Sub-frames** — Type **64**.
- **ADDBA Support** — Click **Enabled**.

4. Click the **Radio 1** tab, and then do the following:
   - In the **Admin Mode** drop-down list, click the **On** option.
   - In the **Radio Mode** drop-down list, click the **a/n** option.
   - In the **Channel Width** drop-down list, click **40MHz**.
   - In the **Guard Interval** drop-down list, click **Short**.
   - If only 802.11n devices are present, you must disable 11n protection and 40MHz protection:
     - **Protection Mode** — Click **None**.
     - **Protection Type** — Click **CTS only** or **RTS CTS**.
   - **Aggregate MSDUs** — Click **Enabled**.
   - **Aggregate MPDU** — Click **Enabled**.
   - **Aggregate MPDU Max Length** — Click **Enabled**.
   - **Agg. MPDU Max # of Sub-frames** — Type **64**.
   - **ADDBA Support** — Click **Enabled**.
5. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
6. In the left pane **Virtual Networks** list, click the VNS you want to configure. The **Topology** tab is displayed.
7. Click the **Privacy** tab. Some client devices will not use 802.11n mode if they are using WEP or TKIP for security. Therefore, do one of the following:
   - Select **None**.

– Select **WPA-PSK**, and then clear the **WPA v.1** option:
  - Select **WPA v.2**.
  - In the **Encryption** drop-down list, click **AES only**.

Note:
To achieve the strongest encryption protection for your VNS, Siemens recommends that you use WPA v.1 or WPA v.2.

8. Click the **QoS Policy** tab.
9. In the **Wireless QoS** section, select the **WMM** option. Some 802.11n client devices will remain at 54Mbps unless WMM is enabled.

Modifying Wireless AP W786-2HPW Radio Properties

The following section describes how to modify a Wireless AP W786-2HPW. For information on how to modify a Wireless 802.11n AP W786C/W788C, see "Modifying Wireless 802.11n AP W786C/W788C Radio Properties" on page 3-27.

To Modify the Wireless AP's Radio Properties:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. Click the appropriate Wireless AP in the list. The **AP Properties** tab is displayed.
3. Click the **Radio** tab you want to modify. For more information on all Radio parameters, see Table 3-9 on page 3-30.

Setting Up the Wireless AP Using Static Configuration

The Wireless AP static configuration feature provides the SCALANCE WLC711 solution with the capability for a network with either a central office or a branch office model. The static configuration settings assist in the setup of branch office support. These settings are not dependent of branch topology, but instead can be employed at any time if required. In the branch office model, Wireless APs are installed in remote sites, while the SCALANCE IWLAN Controller is in a central office. The Wireless APs must be able to interact in both the local site network and the central network. To achieve this model, a static configuration is used.

Note:
If a Wireless AP with a statically configured IP address (without a statically configured Wireless Controller Search List) cannot register with the SCALANCE IWLAN Controller within the specified number of retries, the Wireless AP will use SLP, DNS, and SLP multicast as a backup mechanism.

To Set Up a Wireless AP Using Static Configuration:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. Click the appropriate Wireless AP in the list.
3. Click the **Static Configuration** tab. The Static Configuration page displays.
4. Configure the settings on the Static Configuration page. You must:

- Select a VLAN setting for the Wireless AP

NOTICE

Caution should be exercised when using this feature. For more information, see "Configuring VLAN Tags for Wireless APs" on page 3-44.

If the Wireless AP VLAN is not configured properly (wrong tag), connecting to the Wireless AP may not be possible. To recover from this situation, you will need to reset the Wireless AP to its factory default settings. For more information, see the SCALANCE WLC711 *Maintenance Guide*.

- Select a method of IP address assignment for the Wireless AP.
- For the initial configuration of a Wireless AP to use a static IP address assignment, the following is recommended:
  - Allow the Wireless AP to first obtain an IP address using DHCP. By default, Wireless APs are configured to use the DHCP IP address configuration method.
  - Allow the Wireless AP to connect to the SCALANCE IWLAN Controller using the DHCP assigned IP address.
  - After the Wireless AP has successfully registered to the SCALANCE IWLAN Controller, use the **Static Configuration** tab to configure a static IP address for the Wireless AP, and then save the configuration.
  - Once the static IP address has been configured on the Wireless AP, the Wireless AP can then be moved to its target location, if applicable. (A branch office scenario is an example of a setup that may require static IP assignment.)

Note:
For the initial configuration of a Wireless AP to use a static IP address assignment, the following is recommended:
• Allow the Wireless AP to first obtain an IP address using DHCP. By default, Wireless APs are configured to use the DHCP IP address configuration method.
• Allow the Wireless AP to connect to the SCALANCE IWLAN Controller using the DHCP assigned IP address.
• After the Wireless AP has successfully registered to the SCALANCE IWLAN Controller, use the **Static Configuration** tab to configure a static IP address for the Wireless AP, and then save the configuration.
• Once the static IP address has been configured on the Wireless AP, the Wireless AP can then be moved to its target location, if applicable. (A branch office scenario is an example of a setup that may require static IP assignment.).

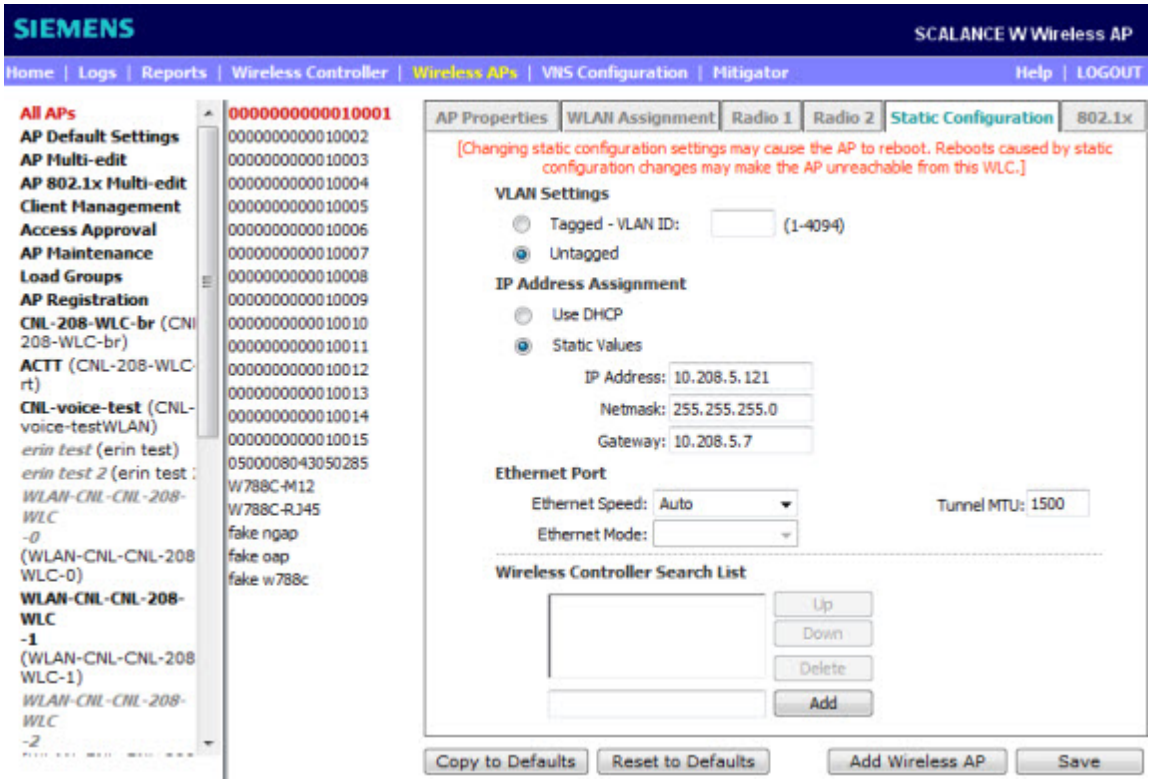


Table 3-10 Static Configuration Properties

Field/Button	Description
VLAN Settings	
Tagged	Select if you want to assign this AP to a specific VLAN and type the value in the box.
Untagged	Select if you want this AP to be untagged. This option is selected by default.
VLAN ID	Enter a VLAN ID. Valid values are 1 to 4094
IP Address Assignment	
Use DHCP	Select to enable Dynamic Host Configuration Protocol (DHCP). This option is enabled by default.
Static Values	Select to specify the IP address of the Wireless AP.
IP Address	Type the IP address of the AP.
Netmask	Type the appropriate subnet mask to separate the network portion from the host portion of the address.
Gateway	Type the default gateway of the network.
Ethernet Port	
Ethernet Speed	If the Wireless AP has an Ethernet port, select values in the **Ethernet Speed** and **Ethernet Mode** drop down lists.
Ethernet Mode	If the Wireless AP has an Ethernet port, select values in the **Ethernet Speed** and **Ethernet Mode** drop down lists.

Table 3-10 Static Configuration Properties (continued)

Field/Button	Description
Tunnel MTU	Enter a static MTU value, from 600 to 1500, in the **Tunnel MTU** box. If the Siemens wireless software cannot discover the MTU size, it enforces the static MTU size. Set the MTU size to allow the source to reduce the packet size and avoid the need to fragment data packets in the tunnel.
Wireless Controller Search List	
Up	Select a controller and click the Up button to modify the order of the controllers. When an AP searches for a controller to register with, it begins with the first controller in the list.
Down	Select a controller and click the Up button to modify the order of the controllers. When an AP searches for a controller to register with, it begins with the first controller in the list.
Delete	Click to remove the controller from the list so that it can no longer control the wireless AP.
Add	In the Add box, type the IP address of the SCALANCE IWLAN Controller that will control this Wireless AP then click the Add button to add the IP address is added to the list. Repeat this process to add the IP addresses of up to three controllers. This feature allows the Wireless AP to bypass the discovery process. If the **Wireless Controller Search List** box is not populated, the Wireless AP will use SLP unicast/multicast, DNS, or DHCP vendor option 43 to discover a SCALANCE IWLAN Controller. For the initial Wireless AP deployment, it is necessary to use one of the described options in “Discovery and Registration Overview” on page 3-9.
Additional Buttons	
Copy to Defaults	To make this Wireless AP’s configuration be the system’s default AP settings, click **Copy to Defaults**. A pop-up dialog asking you to confirm the configuration change is displayed.To confirm resetting the system’s default Wireless AP settings, click **OK.**
Reset to Defaults	If you have a Wireless AP that is already configured with its own settings, but would like the Wireless AP to be reset to use the system’s default AP settings, use the **Reset to Defaults** feature
Add Wireless AP	Click to manually add and register a Wireless AP to the SCALANCE IWLAN Controller
Save	Click to save your changes.

Configuring Telnet/SSH Access

Telnet is used for accessing legacy (non-11n) Access Points. SSH is used for accessing Next-Generation (11n) Access Points.

Note:
The new telnet access password that you set up over the controller’s user interface overrides the default telnet access password.

To enable or disable telnet or SSH access:

1. From the top menu, click **Wireless APs**. The **Wireless APs** screen is displayed.

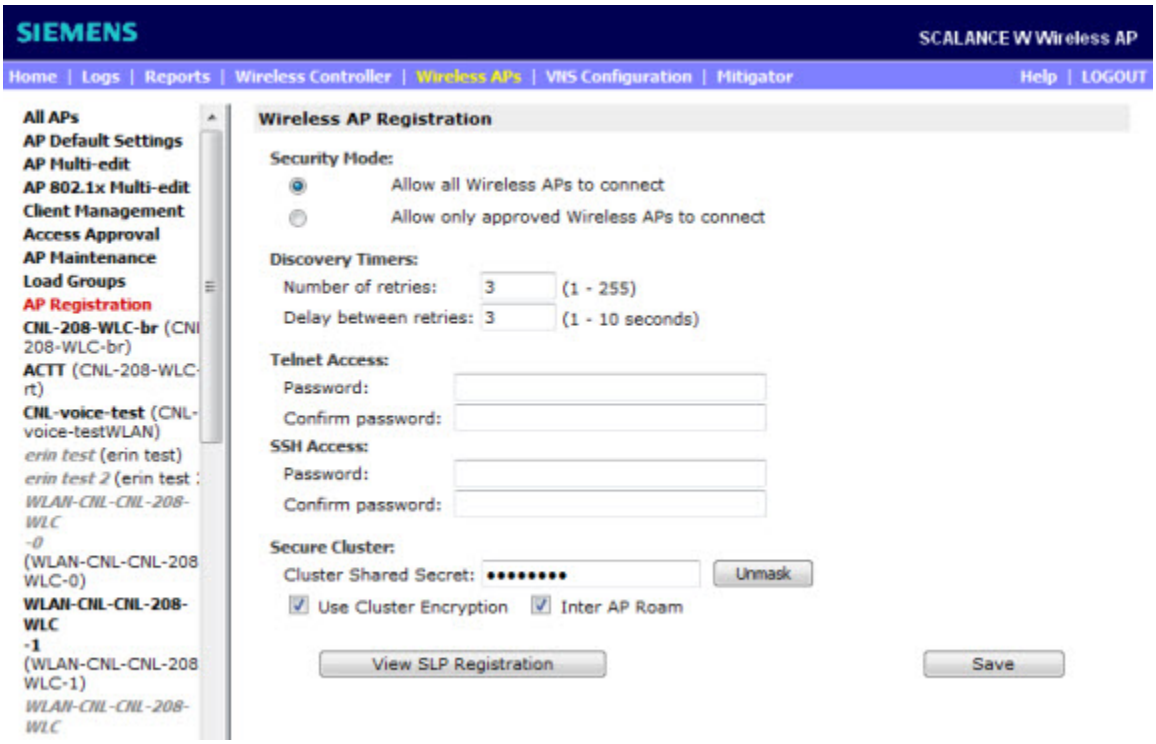
2. In the Wireless AP list, click the Wireless AP for which you want to enable or disable telnet.
3. Click **Advanced**. The Advanced dialog is displayed.
4. In the **Telnet Access/SSH Access** drop-down list, click one of the following:
   - **Enable** — Enables telnet/SSH access
   - **Disable** — Disables telnet/SSH access

Note:
The option to enable or disable telnet access or SSH access will only be displayed if the Wireless AP is a Standard Wireless AP or Outdoor AP. For 11n Wireless APs, SSH is always enabled by default.

5. To save your changes, click **Save**.

To set up a new telnet/SSH access password:

1. From the top menu, click **Wireless APs**. The **Wireless APs** screen is displayed.
2. In the left pane, click **AP Registration**. The **Wireless AP Registration** screen is displayed.



Note:
The **SSH Access** section on the **AP Registration** screen is applicable to the 11n Wireless APs. The **Telnet Access** section is applicable to the Standard Wireless AP or the SCALANCE IWLAN Outdoor AP.

3. If you are setting up a new telnet access password for either the Wireless AP or Wireless Outdoor AP, type the new password in the **Password** box under the **Telnet Access** section. If you are setting up a new SSH access password for the Wireless 802.11n AP, type the new password in the **Password** box under the **SSH Access** section.
4. In the **Confirm Password** box, re-type the password.
5. To save your changes, click **Save**.

Configuring VLAN Tags for Wireless APs

NOTICE

You must exercise caution while configuring a VLAN ID tag. If a VLAN tag is not configured properly, the connectivity between the SCALANCE IWLAN Controller and the Wireless AP will be lost.

To configure the VLAN tag for the Wireless AP, you must connect the Wireless AP to a point on the central office network that does not require VLAN tagging. If the VLAN tagging is configured correctly and you are still on the central office network, the Wireless AP will lose connection with the SCALANCE IWLAN Controller after it is rebooted (the Wireless AP reboots when the configuration settings are saved).

If the Wireless AP does not lose its connection with the SCALANCE IWLAN Controller after the reboot, the VLAN ID has not been configured correctly. After the VLAN is configured correctly, you can move the Wireless AP to the target location.

To Configure Wireless APs with a VLAN Tag:

1. Connect the Wireless AP in the central office to the SCALANCE IWLAN Controller port (or to a network point) that does not require VLAN tagging.
2. From the top menu, click **Wireless APs**. The **Wireless APs** screen is displayed.
3. Click the **Static Configuration** tab.
4. In the **VLAN Settings** section, select **Tagged - VLAN ID**.
5. In the **Tagged - VLAN ID** text box, type the VLAN ID on which the Wireless AP will operate.
6. To save your changes, click **Save**. The Wireless AP reboots and loses connection with the SCALANCE IWLAN Controller.
7. Log out from the SCALANCE IWLAN Controller.
8. Disconnect the Wireless AP from the central office network and move it to the target location.
9. Power up the Wireless AP. The Wireless AP connects to the SCALANCE IWLAN Controller.

   If the Wireless AP does not connect to the SCALANCE IWLAN Controller, the Wireless AP was not configured properly. To recover from this situation, you must reset the Wireless AP to its factory default settings, and reconfigure the static IP address. For more information, see the SCALANCE WLC711 *User Guide*.

Setting Up 802.1x Authentication for a Wireless AP

802.1x is an authentication standard for wired and wireless LANs. The 802.1x standard can be used to authenticate access points to the LAN to which they are connected. 802.1x support provides security for network deployments where access points are placed in public spaces.

To successfully set up 802.1x authentication of a Wireless AP, the Wireless AP must be configured for 802.1x authentication before the Wireless AP is connected to a 802.1x enabled switch port.

NOTICE

If the switch port, to which the Wireless AP is connected to, is not 802.1x enabled, the 802.1x authentication will not take effect.

802.1x authentication credentials can be updated at any time, whether or not the Wireless AP is connected with an active session. If the Wireless AP is connected, the new credentials are sent immediately. If the Wireless AP is not connected, the new credentials are delivered the next time the Wireless AP connects to the SCALANCE IWLAN Controller.

There are two main aspects to the 802.1x feature:

- Credential management — The SCALANCE IWLAN Controller and the Wireless AP are responsible for the requesting, creating, deleting, or invalidating the credentials used in the authentication process.
- Authentication — The Wireless AP is responsible for the actual execution of the EAP-TLS or PEAP protocol.

802.1x authentication can be configured on a per-AP basis. For example, 802.1x authentication can be applied to specific Wireless APs individually or with a multi-edit function.

The 802.1x authentication supports two authentication methods:

- PEAP (Protected Extensible Authentication Protocol)
  - Is the recommended 802.1x authentication method
  - Requires minimal configuration effort and provides equal authentication protection to EAP-TLS
  - Uses user ID and passwords for authentication of access points
- EAP-TLS
  - Requires more configuration effort
  - Requires the use of a third-party Certificate Authentication application
  - Uses certificates for authentication of access points
  - SCALANCE IWLAN Controller can operate in either proxy mode or pass through mode.
    - Proxy mode — The SCALANCE IWLAN Controller generates the public and private key pair used in the certificate.
    - Pass through mode — The certificate and private key is created by the third-party Certificate Authentication application.

Note:
Although a Wireless AP can support using both PEAP and EAP-TLS credentials simultaneously, it is not recommended to do so. Instead, Siemens recommends that you use only one type of authentication and that you install the credentials for only that type of authentication on the Wireless AP.

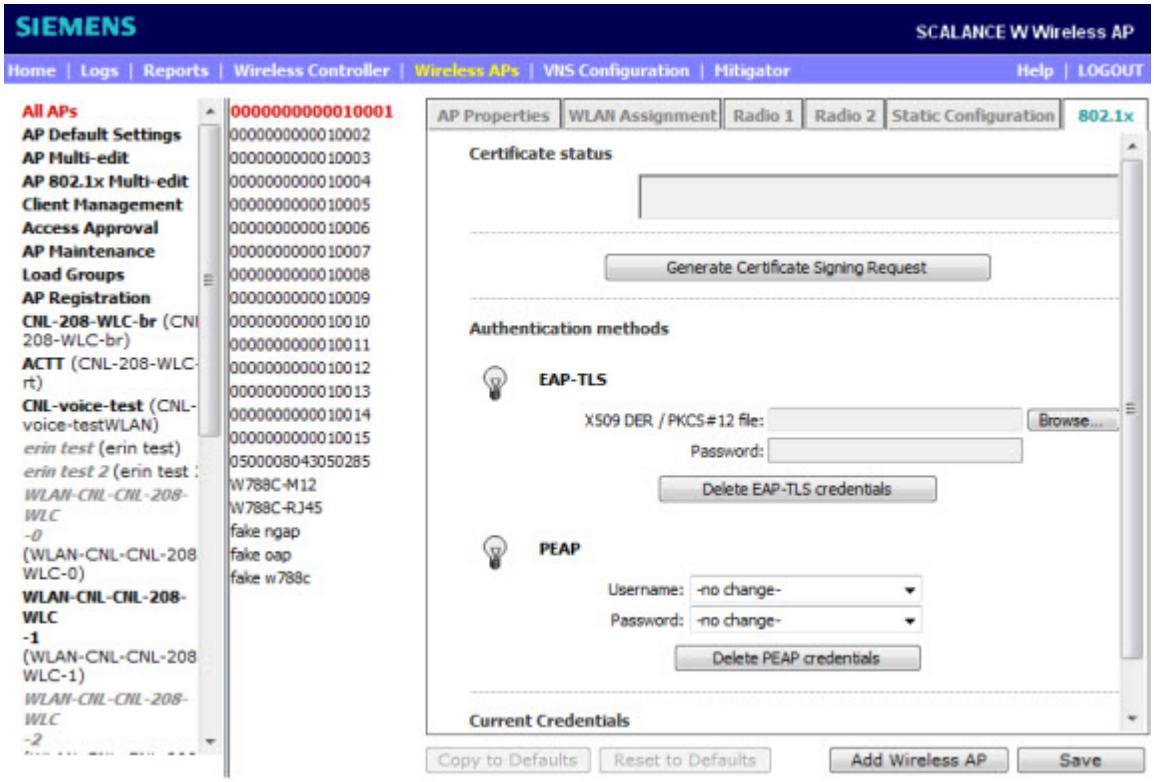
Configuring 802.1x PEAP Authentication

PEAP authentication uses user ID and passwords for authentication. To successfully configure 802.1x authentication of a Wireless AP, the Wireless AP must first be configured for 802.1x authentication before the Wireless AP is deployed on a 802.1x enabled switch port.

To Configure 802.1x PEAP Authentication:

1. From the top menu, click **Wireless APs**. The Wireless AP screen displays.
2. In the Wireless AP list, click the Wireless AP for which you want to configure 802.1x PEAP authentication.

3. Click the **802.1x** tab.



4. In the **Username** drop-down list, click the value you want to assign as the user name credential:
   - **Name** — The name of the Wireless AP, which is assigned on the **AP Properties** tab. The Wireless AP name can be edited.
   - **Serial** — The serial number of the Wireless AP. This setting cannot be edited.
   - **MAC** — The MAC address of the Wireless AP. The setting cannot be edited.
   - **Other** — Click to specify a custom value. A text box is displayed. In the text box, type the value you want to assign as the user name credential.
5. In the **Password** drop-down list, click the value you want to assign as the password credential:
   - **Name** — The name of the Wireless AP, which is assigned on the **AP Properties** tab. The Wireless AP name can be edited.
   - **Serial** — The serial number of the Wireless AP. The setting cannot be edited.
   - **MAC** — The MAC address of the Wireless AP. The setting cannot be edited.
   - **Other** — Click to specify a custom value. A text box is displayed. In the text box, type the value you want to assign as the password credential.
6. To save your changes, click **Save.**

   The 802.1x PEAP authentication configuration is assigned to the Wireless AP. The Wireless AP can now be deployed to a 802.1x enabled switch port.

Configuring 802.1x EAP-TLS Authentication

EAP-TLS authentication uses certificates for authentication. A third-party Certificate Authentication application is required to configure EAP-TLS authentication. Certificates can be overwritten with new ones at any time.

With EAP-TLS authentication, the SCALANCE IWLAN Controller can operate in the following modes:

- Proxy Mode
- Pass Through Mode

Note: When a Wireless AP configured with 802.1x EAP-TLS authentication is connected to a SCALANCE IWLAN Controller, the Wireless AP begins submitting logs to the SCALANCE IWLAN Controller thirty days before the certificate expires to provide administrators with a warning of the impending expiry date.

Proxy Mode

In proxy mode, SCALANCE IWLAN Controller generates the public and private key pair used in the certificate. You can specify the criteria used to create the Certificate Request. The Certificate Request that is generated by the SCALANCE IWLAN Controller is then used by the third-party Certificate Authentication application to create the certificate used for authentication of the Wireless AP. To successfully configure 802.1x authentication of a Wireless AP, the Wireless AP must first be configured for 802.1x authentication before the Wireless AP is deployed on a 802.1x enabled switch port.

To Configure 802.1x EAP-TLS Authentication in Proxy Mode:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. In the Wireless AP list, click the Wireless AP for which you want to configure 802.1x EAP-TLS authentication.
3. Click the **802.1x** tab.
4. Click **Generate Certificate Signing Request**. The **Generate Certificate Signing Request** window is displayed.

5. Type the criteria to be used to create the certificate request. All fields are required:
   - **Country name** — The two-letter ISO abbreviation of the name of the country
   - **State or Province name** — The name of the State/Province
   - **Locality name (city)** — The name of the city
   - **Organization name** — The name of the organization
   - **Organizational Unit name** — The name of the unit within the organization
   - **Common name** — Click the value you want to assign as the common name of the Wireless AP:
     - **Name** — The name of the Wireless AP, which is assigned on the **AP Properties** tab. The Wireless AP name can be edited.
     - **Serial** — The serial number of the Wireless AP. The setting cannot be edited.
     - **MAC** — The MAC address of the Wireless AP. The setting cannot be edited.
     - **Other** — Click to specify a custom value. A text box is displayed. In the text box, type the value you want to assign as the common name of the Wireless AP.
   - **Email address** — The email address of the organization
6. Click **Generate Certificate Signing Request**. A certificate request file is generated (.csr file extension). The name of the file is the Wireless AP serial number. The **File Download** dialog is displayed.
7. Click **Save**. The **Save as** window is displayed.
8. Navigate to the location on your computer that you want to save the generated certificate request file, and then click **Save**.
9. In the third-party Certificate Authentication application, use the content of the generated certificate request file to generate the certificate file (.cer file extension).
10. On the **802.1x** tab, click **Browse**. The **Choose file** window is displayed.
11. Navigate to the location of the certificate file, and click **Open**. The name of the certificate file is displayed in the **X509 DER / PKCS#12 file** box.
12. To save your changes, click **Save.**

    The 802.1x EAP-TLS (certificate and private key) authentication in proxy mode is assigned to the Wireless AP. The Wireless AP can now be deployed to a 802.1x enabled switch port.

Pass Through Mode

In pass through mode, the certificate and private key are created by the third-party Certificate Authentication application. To successfully configure 802.1x authentication of a Wireless AP, the Wireless AP must first be configured for 802.1x authentication before the Wireless AP is deployed on a 802.1x enabled switch port.

Before you configure 802.1x using EAP-TLS authentication in pass through mode, you must first create a certificate using the third-party Certificate Authentication application and save the certificate file in PKCS #12 file format (.pfx file extension) on your system.

To Configure 802.1x EAP-TLS Authentication in Pass Through Mode:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.

2. In the Wireless AP list, click the Wireless AP for which you want to configure 802.1x EAP-TLS authentication.
3. Click the **802.1x** tab.
4. Click **Browse**. The **Choose file** window is displayed.
5. Navigate to the location of the certificate file (.pfx) and click **Open**. The name of the certificate file is displayed in the **X509 DER / PKCS#12 file** box.
6. In the **Password** box, type the password that was used to protect the private key.
7. To save your changes, click **Save.**

   The 802.1x EAP-TLS authentication in pass through mode is assigned to the Wireless AP. The Wireless AP can now be deployed to a 802.1x enabled switch port.

Viewing 802.1x Credentials

When 802.1x authentication is configured on a Wireless AP, the light bulb icon on the **802.1x** tab for the configured Wireless AP is lit to indicate which 802.1x authentication method is used. A Wireless AP can be configured to use both EAP-TLS and PEAP authentication methods. For example, when both EAP-TLS and PEAP authentication methods are configured for the Wireless AP, both light bulb icons on the **802.1x** tab are lit.

Note: You can only view the 802.1x credentials of Wireless APs that have an active session with the SCALANCE IWLAN Controller. If you attempt to view the credentials of a Wireless AP that does not have an active session, the Wireless AP Credentials window displays the following message:

Unable to query Wireless AP: not connected.

To View Current 802.1x Credentials:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. In the Wireless AP list, click the Wireless AP for which you want to view its current 802.1x credentials.
3. Select the 802.1x tab.
4. In the **Current Credentials** section, click **Get Certificate details**. The **Wireless AP Credentials** window is displayed.

Deleting 802.1x Credentials

NOTICE

Caution: Exercise caution when deleting 802.1x credentials. For example, deleting 802.1x credentials may prevent the Wireless AP from being authenticated or cause it to lose its connection with the SCALANCE IWLAN Controller.

To Delete Current 802.1x Credentials:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. In the Wireless AP list, click the Wireless AP for which you want to delete its current 802.1x credentials.

3. Do the following:
   - To delete EAP-TLS credentials, click **Delete EAP-TLS** credentials.
   - To delete PEAP credentials, click **Delete PEAP** credentials.

   The credentials are deleted and the Wireless AP settings are updated.

Note: If you attempt to delete the 802.1x credentials of a Wireless AP that currently does not have an active session with the SCALANCE IWLAN Controller, the credentials are only deleted after the Wireless AP connects with the SCALANCE IWLAN Controller.

Setting Up 802.1x Authentication for Wireless APs Using Multi-edit

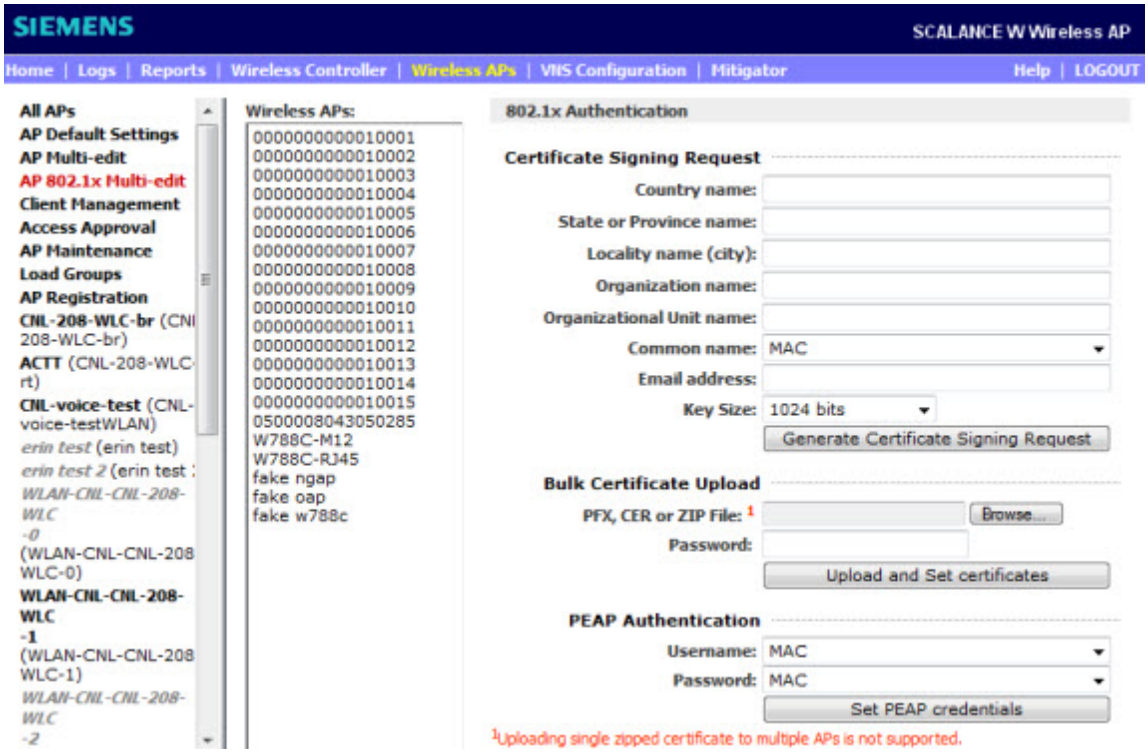
In addition to configuring Wireless APs individually, you can also configure 802.1x authentication for multiple Wireless APs simultaneously by using the AP 802.1x Multi-edit feature.

When you use the AP 802.1x Multi-edit feature, you can choose to:

- Assign EAP-TLS authentication based on generated certificates to multiple Wireless APs by uploading a .pfx, .cer, or .zip file.
- Assign PEAP credentials to multiple Wireless APs based on a user name and password that you define

To Configure 802.1x EAP-TLS Authentication in Proxy Mode Using Multi-edit:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. In the left pane, click **AP 802.1x Multi-edit**.



3. In the Wireless AP**s** list, click one or more Wireless APs to configure. To select multiple Wireless APs, click the Wireless APs from the list while pressing the CTRL key.
4. In the **Certificate Signing Request** section, type the following:
   - **Country name** — The two-letter ISO abbreviation of the name of the country
   - **State or Province name** — The name of the State/Province
   - **Locality name (city)** — The name of the city
   - **Organization name** — The name of the organization
   - **Organizational Unit name** — The name of the unit within the organization
   - **Common name** — Click the value you want to assign as the common name of the Wireless AP:
     - **Name** — The name of the Wireless AP, which is assigned on the **AP Properties** tab. The Wireless AP name can be edited.
     - **Serial** — The serial number of the Wireless AP. The Wireless AP serial number cannot be edited.
     - **MAC** — The MAC address of the Wireless AP. The Wireless AP MAC address cannot be edited.
   - **Email address** — The email address of the organization
5. Click **Generate Certificates**. The **AP 802.1x Multi-edit progress** window is displayed, which provides the status of the configuration process. Once complete, the **File Download** dialog is displayed.
6. Click **Save**. The **Save as** window is displayed.
7. Navigate to the location on your computer that you want to save the generated **certificate_requests.tar** file, and then click **Save**.

   The **certificate_requests.tar** file contains a certificate request (.csr) file for each Wireless AP.
8. Do one of the following:
   - For each certificate request, generate a certificate using the third-party Certificate Authentication application. This method will produce a certificate for each Wireless AP. Once complete, zip all the certificates files (.cer) into one .zip file.
   - Use one of the certificate requests and generate one certificate using the Certificate Authentication application. This method will produce one certificate that can be applied to all Wireless APs.
9. In the **Bulk Certificate Upload** section, click **Browse**. The **Choose file** window is displayed.
10. Navigate to the location of the file (.zip or .cer), and then click **Open**. The name of the file is displayed in the **PFX, CER or ZIP Archive** box.
11. Click **Upload and Set certificates**. Once complete, the **Settings updated** message is displayed in the footer of the SCALANCE W Wireless Assistant.

    The 802.1x EAP-TLS authentication configuration is assigned to the Wireless APs. The Wireless APs can now be deployed to 802.1x enabled switch ports.

Configuring 802.1x EAP-TLS Authentication in Pass Through Mode Using Multi-edit:

When you configure 802.1x EAP-TLS authentication in pass through mode using Multi-edit, do one of the following:

- Generate a certificate for each Wireless AP using the third-party Certificate Authentication application. When generating the certificates:
  - Use the Common name value (either Name, Serial, or MAC) of the Wireless AP to name each generated certificate.
  - Use a common password for each generated certificate.
  - All .pfx files created by the third-party Certificate Authentication application must be zipped into one file.
- Generate one certificate, using the third-party Certificate Authentication application, to be applied to all Wireless APs. When generating the certificate, use the Common name value (either Name, Serial, or MAC) of the Wireless AP to name the generated certificate.

To Configure 802.1x EAP-TLS Authentication in Pass Through Mode Using Multi-edit:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. In the left pane, click **AP 802.1x Multi-edit**.
3. In the Wireless AP**s** list, click one or more Wireless APs to configure. To select multiple Wireless APs, click the Wireless APs from the list while pressing the CTRL key.
4. In the **Bulk Certificate Upload** section, click **Browse**. The **Choose file** window is displayed.
5. Navigate to the location of the file (.zip or .pfx), and then click **Open**. The name of the file is displayed in the **PFX, CER or ZIP Archive** box.
6. In the **Password** box, type the password used during the certificates generation process.
7. Click **Upload and Set certificates**. Once complete, the **Settings updated** message is displayed in the footer of the SCALANCE W Wireless Assistant.

   The 802.1x EAP-TLS authentication configuration is assigned to the Wireless APs. The Wireless APs can now be deployed to 802.1x enabled switch ports.

To Configure 802.1x PEAP Authentication Using Multi-edit:

1. From the top menu, click Wireless AP **Configuration**. The Wireless AP screen is displayed.
2. In the left pane, click **AP 802.1x Multi-edit**.
3. In the **Wireless APs** list, click one or more APs to edit. To select multiple APs, click the APs from the list while pressing the CTRL key.
4. In the **PEAP Authentication** section, do the following:
   - In the **Username** drop-down list, click the value you want to assign as the user name credential:
     - **Name** — The name of the Wireless AP, which is assigned on the **AP Properties** tab. The Wireless AP name can be edited.
     - **Serial** — The serial number of the Wireless AP. The Wireless AP serial number cannot be edited.

- **MAC** — The MAC address of the Wireless AP. The Wireless AP MAC address cannot be edited.

– In the **Password** drop-down list, click the value you want to assign as the password credential:

- **Name** — The name of the Wireless AP, which is assigned on the **AP Properties** tab. The Wireless AP name can be edited.
- **Serial** — The serial number of the Wireless AP. The Wireless AP serial number cannot be edited.
- **MAC** — The MAC address of the Wireless AP. The Wireless AP MAC address cannot be edited.

5. Click **Set PEAP credentials**. The **AP 802.1x Multi-edit progress** window is displayed, which provides the status of the configuration process. Once complete, the **Settings updated** message is displayed in the footer of the SCALANCE W Wireless Assistant.

   The 802.1x PEAP authentication configuration is assigned to the Wireless APs. The Wireless APs can now be deployed to 802.1x enabled switch ports.

Configuring the Default Wireless AP Settings

Wireless APs are added with default settings. You can modify the system's Wireless AP default settings, and then use these default settings to configure newly added Wireless APs. In addition, you can base the system's Wireless AP default settings on an existing Wireless AP configuration or you can have configured Wireless APs inherit the properties of the default Wireless AP configuration when they register with the system.

The process of configuring the default Wireless AP settings is divided into up to six tabs:

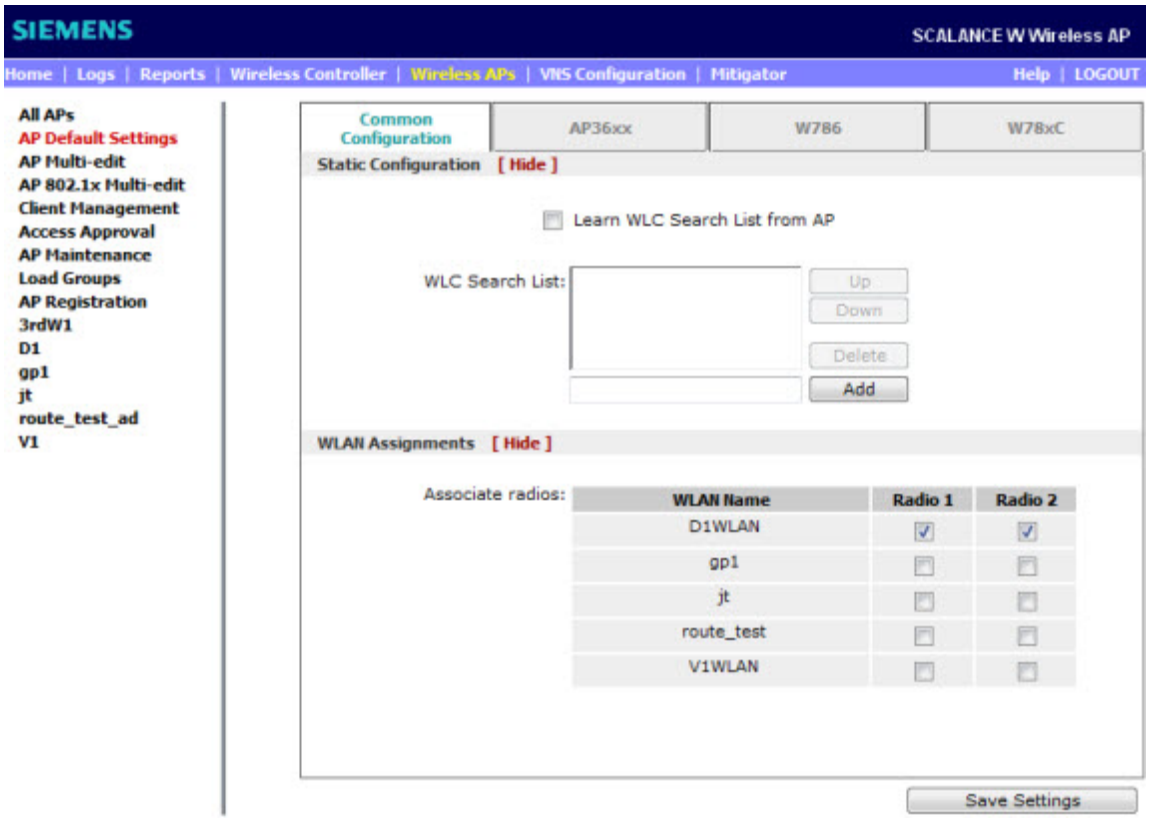
- **Common Configuration** — Configure common configuration, such as WLAN assignments and static configuration options for all Wireless APs. See "Configure Common Configuration Default AP Settings" on page 3-53.
- **AP36xx** — Configure the default settings for the Wireless 802.11n APs. See "Configure AP36xx Default AP Settings" on page 3-55.
- **W786** — Configure the default settings for the W786 access points. See "Configure W786 Default AP Settings" on page 3-64.
- **W78xC**— Configure the default settings for the Wireless 802.11n APs. See "Configure W78xC Default AP Settings" on page 3-65.

Configure Common Configuration Default AP Settings

To Configure Common Configuration Default AP Settings:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.

2. In the left pane, click **AP Default Settings**. The **Common Configuration** tab is displayed.



3. In the **Static Configuration** section, do one of the following:
   - To allow each Wireless AP to provide its own WLC Search List, select the **Learn WLC Search List from AP** checkbox.
   - To specify a common WLC Search List for all Wireless APs, clear the **Learn WLC Search List from AP** checkbox.

   The Wireless AP is successful when it finds a SCALANCE IWLAN Controller that will allow it to register.

   This feature allows the Wireless AP to bypass the discovery process. If the **Wireless Controller Search List** box is not populated, the Wireless AP will use SLP unicast/multicast, DNS, or DHCP vendor option 43 to discover a SCALANCE IWLAN Controller.

   The DHCP function for wireless clients must be provided locally by a local DHCP server, unless each wireless client has a static IP address.

   For the initial Wireless AP deployment, it is necessary to use one of the described options in "Discovery and Registration Overview" on page 3-9.

4. In the **WLAN Assignments** section, assign the **Radios** for each VNS in the list by selecting or clearing the option boxes.

5. To save your changes, click **Save Settings**.

Configure AP36xx Default AP Settings

To Configure AP36xx Default AP Settings:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. In the left pane, click **AP Default Settings**. The **Common Configuration** tab is displayed.
3. Click the **AP36xx** tab.

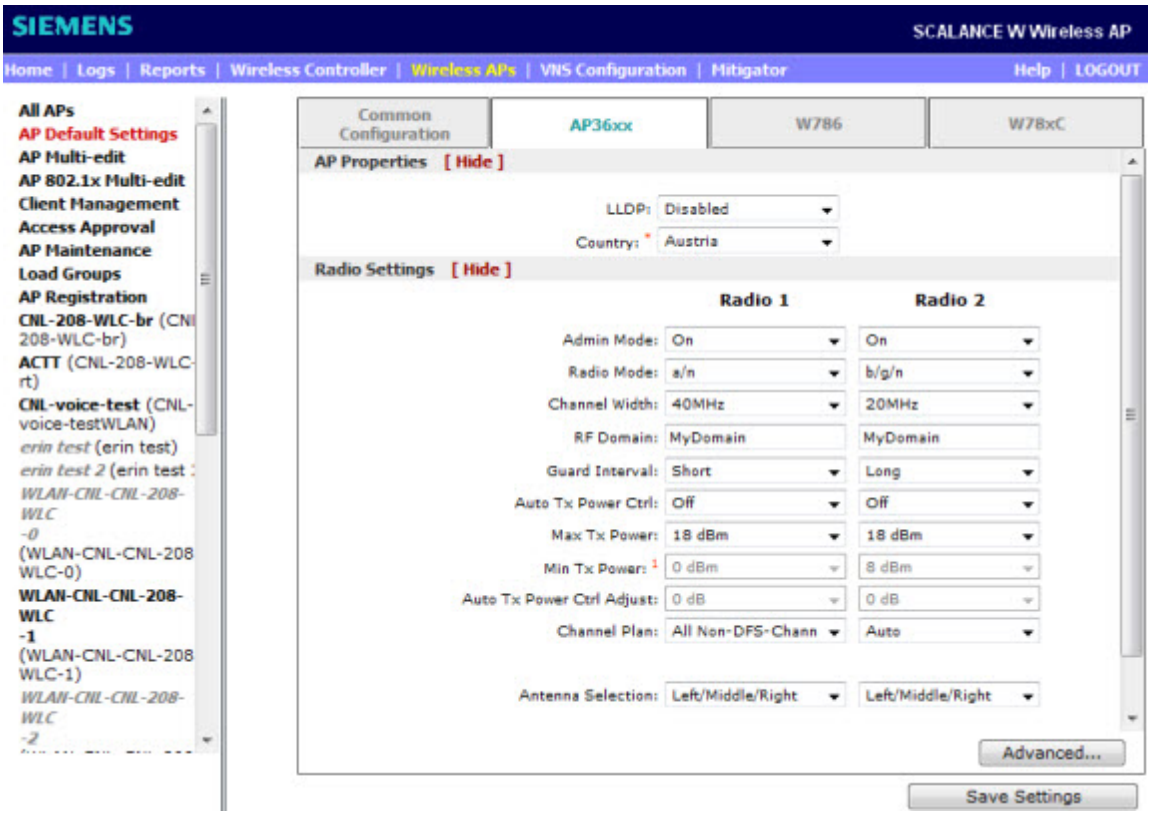


Table 3-11 AP Default Settings

Field	Description
AP Properties	
LLDP	Click to **Enable** or **Disable** the Wireless AP from broadcasting LLDP information. This option is disabled by default. If SNMP is enabled on the SCALANCE IWLAN Controller and you enable LLDP, the **LLDP Confirmation** dialog is displayed. Select one of the following: **Proceed (not recommended)** — Select this option to enable LLDP and keep SNMP running, and then click **OK**. **Disable SNMP publishing, and proceed** — Select this option to enable LLDP and disable SNMP, and then click **OK**. For more information on using SNMP, see the SCALANCE WLC711 *Maintenance Guide*.

Table 3-11 AP Default Settings (continued)

Field	Description
Announcement Interval	If LLDP is enabled, type how often the Wireless AP advertises its information by sending a new LLDP packet. This value is measured in seconds. If there are no changes to the Wireless AP configuration that impact the LLDP information, the Wireless AP sends a new LLDP packet according to this schedule.
Announcement Delay	If LLDP is enabled, type the announcement delay. This value is measured in seconds. If a change to the Wireless AP configuration occurs which impacts the LLDP information, the Wireless AP sends an updated LLDP packet. The announcement delay is the length of time that delays the new packet delivery. The announcement delay helps minimize LLDP packet traffic. **Note:** The **Time to Live** value cannot be directly edited. The **Time to Live** value is calculated as four times the **Announcement Interval** value.
Country	Click the country of operation. This option is only available with certain licenses.
Radio Settings (Radio 1 and Radio 2)	
Admin mode	Select On to enable this radio; Select Off to disable this radio.
Radio mode	Click the radio mode based on the type of AP. For more information on the available Radio modes for: • 36xx, and W78xC model APs, see “Siemens Wireless 802.11n AP” on page 3-4. Depending on the radio modes you select, some of the radio settings may not be available for configuration.
Channel Width	Click the channel width for the radio: **20MHz** — Click to allow 802.11n clients to use the primary channel (20MHz) and non-802.11n clients, beacons, and multicasts to use the 802.11b/g radio protocols. **40MHz** — Click to allow 802.11n clients that support the 40MHz frequency to use 40MHz, 20MHz, or the 802.11b/g radio protocols. 802.11n clients that do not support the 40MHz frequency can use 20MHz or the 802.11b/g radio protocols and non-802.11n clients, beacons, and multicasts use the 802.11b/g radio protocols. **Auto** — Click to automatically switch between 20MHz and 40MHz channel widths, depending on how busy the extension channel is.
RF Domain	Type a string that uniquely identifies a group of APs that cooperate in managing RF channels and transmission power levels. The maximum length of the string is 16 characters. The RF Domain is used to identify a group of Wireless APs.
Guard Interval	Click a guard interval, **Long** or **Short**, when a 40MHz channel is used. Siemens recommends that you use a short guard interval in small rooms (for example, a small office space) and a long guard interval in large rooms (for example, a conference hall).

Table 3-11 AP Default Settings (continued)

Field	Description
Auto Tx Power Ctrl	Click to either enable or disable ATPC from the **Auto Tx Power Ctrl** drop-down list. ATPC automatically adapts transmission power signals according to the coverage provided by the Wireless APs. After a period of time, the system will stabilize itself based on the RF coverage of your Wireless APs.
Max Tx Power	Click the appropriate Tx power level from the **Max TX Power** drop-down list. The values in the **Max TX Power** drop-down are in dBm.
Min Tx Power	If ATPC is enabled, click the minimum Tx power level to which the range of transmit power can be adjusted: **0** to **23** (b/g or b/g/n) or **24** (a or a/n) dBm. Siemens recommends that you use **0 dBm** if you do not want to limit the potential Tx power level range that can be used.
Auto Tx Power Ctrl Adjust	If ATPC is enabled, click the Tx power level that can be used to adjust the ATPC power levels that the system has assigned. Siemens recommends that use **0 dBm** during your initial configuration. If you have an RF plan that recommends Tx power levels for each Wireless AP, compare the actual Tx power levels your system has assigned against the recommended values your RF plan has provided. Use the **Auto Tx Power Ctrl Adjust** value to achieve the recommended values.

Table 3-11 AP Default Settings (continued)

Field	Description
Channel Plan	If ACS is enabled you can define a channel plan for the Wireless AP. Defining a channel plan allows you to limit which channels are available for use during an ACS scan. For example, you may want to avoid using specific channels because of low power, regulatory domain, or radar interference. For **5 GHz Radio nodes**, click one of the following: **All channels** — ACS scans all channels for an operating channel and returns both DFS and non-DFS channels, if available. **All Non-DFS Channels** — ACS scans all non-DFS channels for an operating channel. **Custom** — To configure individual channels from which the ACS will select an operating channel, click **Configure**. The **Custom Channel Plan** dialog displays. By default, all channels participate in the channel plan. Click the individual channels you want to include in the channel plan. To select contiguous channels, use the Shift key. To select multiple, non-contiguous channels in the list, use the CTRL key. Click **OK** to save the configuration. For **2.4 GHz Radio nodes**, click one of the following: **3 Channel Plan** — ACS will scan the following channels: **1**, **6**, and **11** in North America, and **1**, **7**, and **13** in the rest of the world. **4 Channel Plan** — ACS will scan the following channels: **1**, **4**, **7**, and **11** in North America, and **1**, **5**, **9**, and **13** in the rest of the world. **Auto** — ACS will scan the default channel plan channels: **1**, **6**, and **11** in North America, and **1**, **5**, **9**, and **13** in the rest of the world. **Custom** — If you want to configure individual channels from which the ACS will select an operating channel, click **Configure**. The **Add Channels** dialog is displayed. Click the individual channels you want to add to the channel plan while pressing the CTRL key, and then click **OK**.
Antenna Selection	**Antenna Selection** — Click the antenna, or antenna combination, you want to configure on this radio. When you configure the Wireless 802.11n AP to use specific antennas, the transmission power is recalculated; the **Current Tx Power Level** value for the radio is automatically adjusted to reflect the recent antenna configuration. It takes approximately 30 seconds for the change to the **Current Tx Power Level** value to be reflected in the SCALANCE W Wireless Assistant. Also, the radio is reset causing client connections on this radio to be lost. **Note: Antenna Selection** is not applicable to the Outdoor AP models.

Table 3-11 AP Default Settings (continued)

Field	Description
Advanced dialog - AP Properties	
Poll Timeout	Type the timeout value, in seconds. The Wireless AP uses this value to trigger re-establishing the link with the SCALANCE IWLAN Controller if the Wireless AP does not get an answer to its polling. The default value is 10 seconds. **Note:** If you are configuring session availability, the **Poll Timeout** value should be 1.5 to 2 times of **Detect link failure** value on **AP Properties** screen. For more information, see "Session Availability" on page 12-9.
Secure Tunnel	Click to Enable or Disable secure tunnel. This feature, when enabled, provides encryption, authentication, and key management for data traffic between the AP and/or controllers. **Note:** Secure tunnel can only be enabled when a V8.11 compatible AP is added to the network. Secure tunnel must be disabled for APs running previous versions.
Encrypt control traffic between AP & Controller	Click to Enable or Disable encryption of the control traffic between the AP and/or controllers.
Remote Access	Click to **Enable** or **Disable** telnet access or SSH to the Wireless AP
Location-based Service	Click to **Enable** or **Disable** location-based service on this Wireless AP. Location-based service allows you to use this Wireless AP with an AeroScout or Ekahau solution.
Maintain client sessions in event of poll failure	Click to **Enable** or **Disable** (using a bridged at AP VNS) the AP remaining active if a link loss with the controller occurs.This option is enabled by default.
Restart service in the absence of controller	Click to **Enable** or **Disable** (if using a bridged at AP VNS) to ensure the Wireless AP continues providing service if the Wireless AP's connection to the SCALANCE IWLAN Controller is lost. If this option is enabled, it allows the Wireless AP to start a bridged at AP VNS even in the absence of a SCALANCE IWLAN Controller.
Use broadcast for disassociation	Click to **Enable** or **Disable** if you want the Wireless AP to use broadcast disassociation when disconnecting all clients, instead of disassociating each client one by one. This will affect the behavior of the AP under the following conditions: • If the Wireless AP is preparing to reboot or to enter one of the special modes (DRM initial channel selection). • If a BSSID is deactivated or removed on the Wireless AP. This option is disabled by default.

Table 3-11 AP Default Settings (continued)

Field	Description
Real Capture	Click **Start** to start real capture server on the AP. This feature can be enabled for each AP individually. Statistics are captured using an external connection to a Windows WireShark client. In Wireshark, by selecting the remote APs' IP address and null authentication, the wired and enabled wireless interfaces are listed as available for capture. Default capture server timeout is set to 300 seconds and the maximum configurable timeout is 1 hour. Capture statistics are found on the Active Wireless APs report (see Viewing Statistics for APs).
Advanced dialog - Radio Settings	
DTIM	Type the desired DTIM (Delivery Traffic Indication Message) period — the number of beacon intervals between two DTIM beacons. To ensure the best client power savings, use a large number. Use a small number to minimize broadcast and multicast delay. The default value is **5**.
Beacon Period	Type the desired time, in milliseconds, between beacon transmissions. The default value is **100** milliseconds.
RST/CTS	Type the packet size threshold, in bytes, above which the packet will be preceded by an RTS/CTS (Request to Send/Clear to Send) handshake. The default value is **2346**, which means all packets are sent without RTS/CTS. Reduce this value only if necessary.
Frag. Threshold	Type the fragment size threshold, in bytes, above which the packets will be fragmented by the AP prior to transmission. The default value is **2346**, which means all packets are sent unfragmented.
Max % of non-unicast traffic per Beacon period	Enter the maximum percentage of time that the AP will transmit non-unicast packets (broadcast and multicast traffic) for each configured Beacon Period. For each non-unicast packet transmitted, the system calculates the airtime used by each packet and drops all packets that exceed the configured maximum percentage. By restricting non-unicast traffic, you limit the impact of broadcasts and multicasts on overall system performance.
Maximum Distance	Enter a value from 100 to 15,000 meters that identifies the maximum link distance between APs that participate in a WDS. This value ensures that the acknowledgement of communication between APs does not exceed the timeout value predefined by the 802.11 standard. The default value is 100 meters. If the link distance between APs is greater than 100 meters, configure the maximum distance up to 15,000 meters so that the software increases the timeout value proportionally with the distance between APs.

Table 3-11 AP Default Settings (continued)

Field	Description
Dynamic Channel Selection	Click one of the following: **Off** — Disables DCS. **Monitor Mode** — If traffic or noise levels exceed the configured DCS thresholds, an alarm is triggered and an information log is generated. **Active Mode** — If traffic or noise levels exceed the configured DCS thresholds, an alarm is triggered and an information log is generated. In addition, the Wireless AP will cease operating on the current channel and ACS will automatically select an alternate channel for the Wireless AP to operate on. **DCS Noise Threshold** — If DCS is enabled, type the noise interference level, measured in dBm, above which ACS will scan for a new operating channel for the Wireless AP if the threshold is exceeded. **DCS Channel Occupancy Threshold** — If DCS is enabled, type the channel utilization level, measured as a percentage, above which ACS will scan for a new operating channel for the Wireless AP if the threshold is exceeded. **DCS Update Period** — If DCS is enabled, type the time, measured in minutes that determines the period during which the Wireless AP averages the **DCS Noise Threshold** and **DCS Channel Occupancy Threshold** measurements. If either one of these thresholds is exceeded, then the Wireless AP will trigger ACS.
Rx Diversity	Click **Best** for the best signal from both antennas, or **Left** or **Right** to choose either of the two diversity receiving antennas. The default and recommended selection is **Best**. If only one antenna is connected, use the corresponding **Left** or **Right** diversity setting. Do not use **Best** if two identical antennas are not used.
Tx Diversity	Click **Alternate** for the best signal from both antennas, or **Left** or **Right** to choose either of the two diversity receiving antennas. The default selection is **Alternate** that maximizes performance for most clients. However, some clients may behave oddly with Tx Diversity set to **Alternate**. Under those circumstances, Siemens recommends that you use either **Left** or **Right** for Tx Diversity. If only one antenna is connected, use the corresponding **Left** or **Right** diversity setting. Do not use **Alternate** if two identical antennas are not used.
Preamble	Click a preamble type for 11b-specific (CCK) rates: **Short**, **Long**, or **Auto**. The recommended value is **Auto**. Click **Short** if you are sure that there is no 11b APs or client in the vicinity of this AP. Click **Long** if compatibility with 11b clients is required.
Protection Mode	Click a protection mode: **None**, **Auto**, or **Always**. The default and recommended setting is **Auto**. Click **None** if 11b APs and clients are not expected. Click **Always** if you expect many 11b-only clients.

Table 3-11 AP Default Settings (continued)

Field	Description
Protection Rate	Click a protection rate: **1**, **2**, **5.5**, or **11** Mbps. The default and recommended setting is **11**. Only reduce the rate if there are many 11b clients in the environment or if the deployment has areas with poor coverage. For example, rates lower than **11** Mbps are required to ensure coverage.
Protection Type	Click a protection type: **CTS Only** or **RTS CTS**. The default and recommended setting is **CTS Only**. Click **RTS CTS** only if an 11b AP that operates on the same channel is detected in the neighborhood, or if there are many 11b-only clients in the environment.
Advanced dialog - Enhanced Rate Control	
Min. Basic Rate	For each radio, click the minimum data rate that must be supported by all stations in a BSS: • Click **1**, **2**, **5.5**, or **11** Mbps for 11b and 11b+11g modes. • Click **1**, **2**, **5.5**, **6**, **11**, **12**, or **24** Mbps for 11g-only mode. • Click **6**, **12**, or **24** Mbps for 11a mode. If necessary, the **Max Basic Rate** choices adjust automatically to be higher or equal to the **Min Basic Rate**. If both **Min Basic Rate** and **Max Basic Rate** are set to an 11g-specific (OFDM) rate, (for example, **6**, **12**, or **24** Mbps) all basic rates will be 11g-specific.
Max. Basic Rate	For each radio, click the maximum data rate that must be supported by all stations in a BSS: • Click **1**, **2**, **5.5**, or **11** Mbps for 11b and 11b+11g modes. • Click **1**, **2**, **5.5**, **6**, **11**, **12**, or **24** Mbps for 11g-only mode. • Click **6**, **12**, or **24** Mbps for 11a mode. If necessary, the **Max Basic Rate** choices adjust automatically to be higher or equal to the **Min Basic Rate**. If both **Min Basic Rate** and **Max Basic Rate** are set to an 11g-specific (OFDM) rate, (for example, **6**, **12**, or **24** Mbps) all basic rates will be 11g-specific.
Max. Operational Rate	For each radio, click the maximum data rate that clients can operate at while associated with the AP: • Click: **1**, **2**, **5.5**, or **11** Mbps for 11b-only mode. • Click **1**, **2**, **5.5**, **6**, **9**, **11**, **12**, **18**, **24**, **36**, **28**, or **54** Mbps for 11b+11g or 11g-only modes. • Click **6**, **9**, **12**, **18**, **24**, **36**, **48**, or **54** Mbps for 11a mode. If necessary, the **Max Operational Rate** choices adjust automatically to be higher or equal to the **Min Basic Rate**.
Advanced dialog - No of Retries	
Background BK	For each radio, click the number of retries for the Background transmission queue. The default value is **adaptive (multi-rate)**. The recommended setting is **adaptive (multi-rate)**.
Best Effort BE	For each radio, click the number of retries for the Best Effort transmission queue. The default value is **adaptive (multi-rate)**. The recommended setting is **adaptive (multi-rate)**.

Table 3-11 AP Default Settings (continued)

Field	Description
Video VI	For each radio, click the number of retries for the Video transmission queue. The default value is **adaptive (multi-rate)**. The recommended setting is **adaptive (multi-rate)**.
Voice VO	For each radio, click the number of retries for the Voice transmission queue. The default value is **adaptive (multi-rate)**. The recommended setting is **adaptive (multi-rate)**.
Turbo Voice TVO	For each radio, click the number of retries for the Turbo Voice transmission queue. The default value is **adaptive (multi-rate)**. The recommended setting is **adaptive (multi-rate)**.
Advanced dialog - 11n Settings	
Protection Mode	Click a protection mode: **None**, **Auto**, or **Always**. The default and recommended setting is **Auto**. Click **None** if 11b APs and clients are not expected. Click **Always** if you expect many 11b-only clients.
Protection Type	Click a protection type, **CTS Only** or **RTS- CTS**, when a 40MHz channel is used. This protects high throughput transmissions on extension channels from interference from non-11n APs and clients.
40MHz Prot. Channel Offset	Select a 20MHz channel offset if the deployment is using channels that are 20MHz apart (for example, using channels **1**, **5**, **9**, and **13**) or a 25MHz channel offset if the deployment is using channels that are 25MHz apart (for example, using channels **1**, **6**, and **11**).
40MHz Channel Busy Threshold	Type the extension channel threshold percentage, which if exceeded, will disable transmissions on the extension channel (40MHz).
Aggregate MSDUs	Click an aggregate MSDU mode: **Enabled** or **Disabled**. Aggregate MSDU increases the maximum frame transmission size.
Aggregate MPDUs	Click an aggregate MPDU mode: **Enabled** or **Disabled**. Aggregate MPDU provides a significant improvement in throughput.
Aggregate MPDU Max Length	Type the maximum length of the aggregate MPDU. The value range is 1024-65535 bytes.
Agg. MPDU Max # of Sub-frames	Type the maximum number of sub-frames of the aggregate MPDU. The value range is 2-64.
ADDBA Support	Click an ADDBA support mode: **Enabled** or **Disabled**. ADDBA, or block acknowledgement, provides acknowledgement of a group of frames instead of a single frame. **ADDBA Support** must be enabled if **Aggregate MPDU** is enable.
LDPC (Available for W78xC APs.)	Click an LDPC mode: **Enabled** or **Disabled**. LDPC increases the reliability of the transmission resulting in a 2dB increased performance compared to traditional 11n coding.

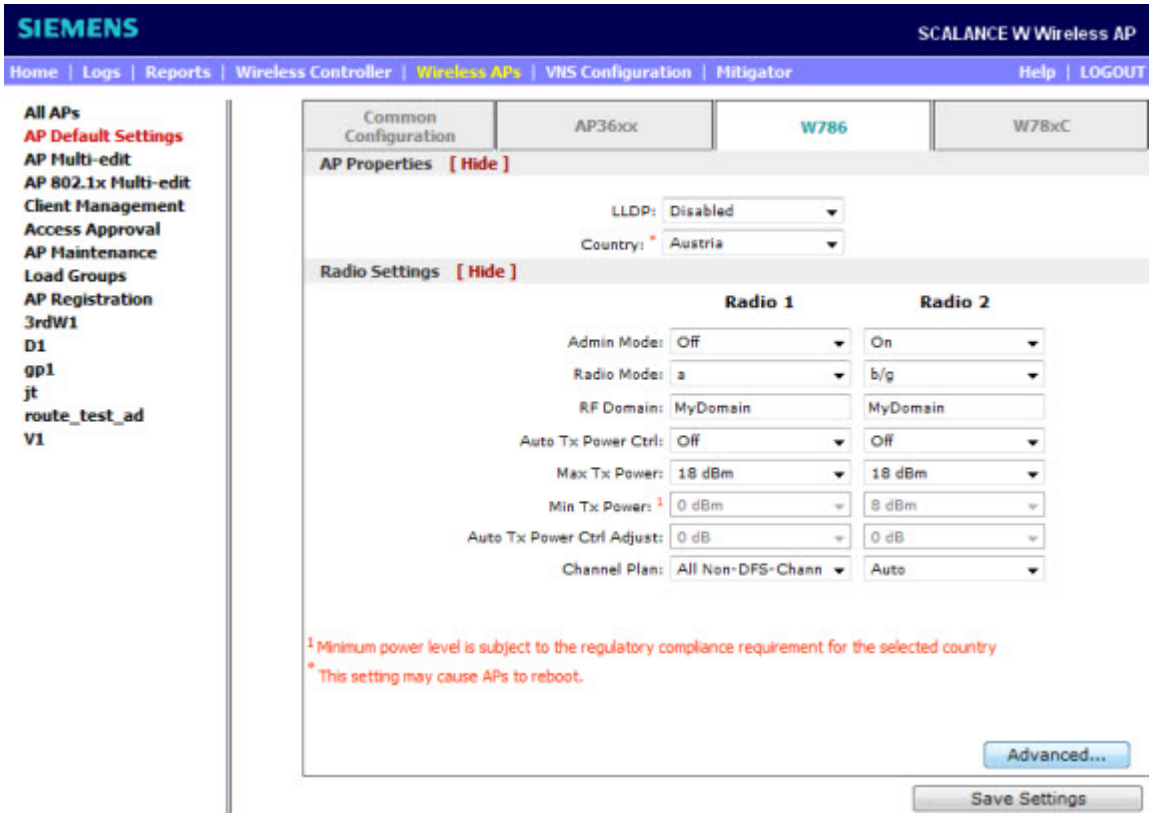
Table 3-11 AP Default Settings (continued)

Field	Description
STBC (Available for W78xC APs.)	Click an STBC mode: **Enabled** or **Disabled**. STBC is a simple open loop transmit diversity scheme. When enabled, STBC configuration is 2x1 (one spatial stream split into two space-time streams). TXBF will override STBC if both are enabled for single stream rates.
TxBF (Available for W78xC APs.)	Click a TxBF mode: **Enabled** or **Disabled**. Tx Beam Forming focuses transmission beams directly at the intended receiver while reducing the overall interference generated by the transmitter.

Configure W786 Default AP Settings

To Configure W786 Default Access Point Settings:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. In the left pane, click **AP Default Settings**. The **Common Configuration** tab is displayed.
3. Click the **W786** tab.



4. Configure the following Default AP Settings as required:
   - AP Properties
   - Radio Settings
   - Advanced Settings

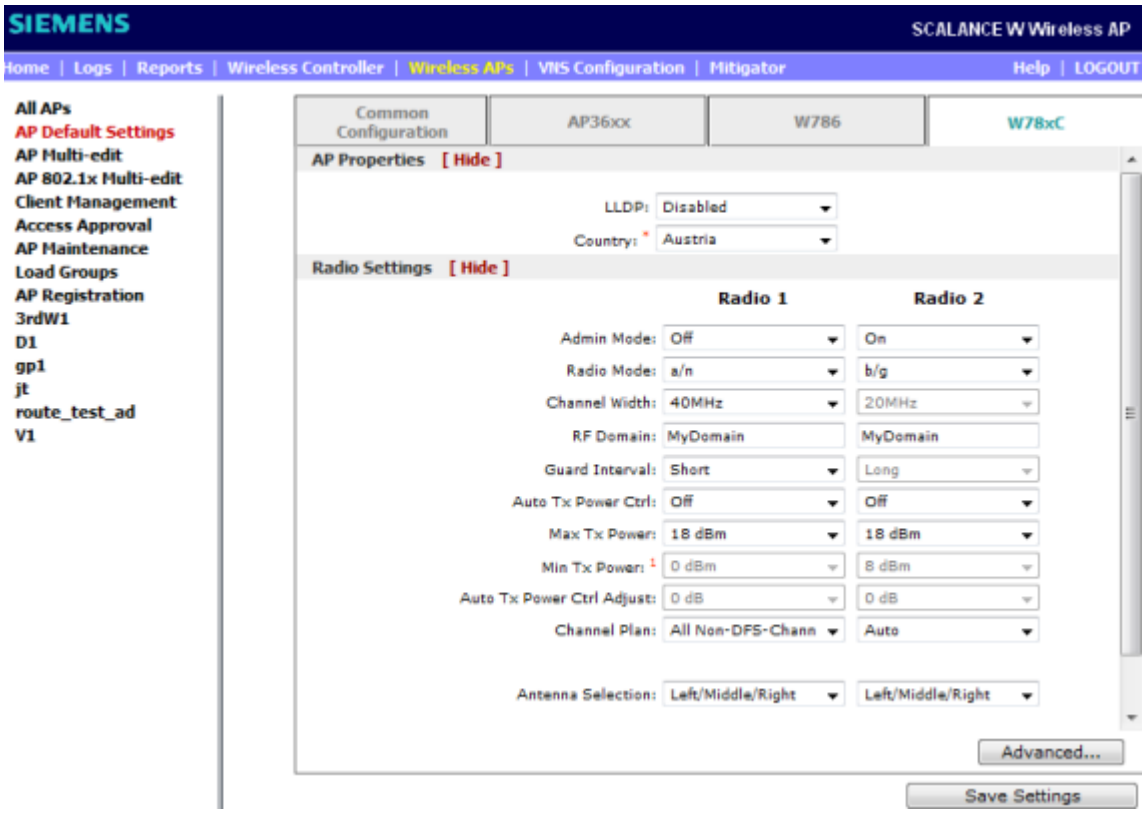
For detailed information, see Table 3-11 on page 3-55.

5. To save your changes, click **Save Settings**.

Configure W78xC Default AP Settings

To Configure W78xC Default AP Settings:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. In the left pane, click **AP Default Settings**. The **Common Configuration** tab is displayed.
3. Click the **W78xC** tab.



4. Configure the following Default AP Settings as required:
   - AP Properties
   - Radio Settings
   - Advanced Settings

   For detailed information, see Table 3-11 on page 3-55.
5. To save your changes, click **Save Settings**.

Modifying a Wireless AP's Properties Based on a Default AP Configuration

If you have a Wireless AP that is already configured with its own settings, but would like the Wireless AP to be reset to use the system's default AP settings, use the **Reset to Defaults** feature on the **AP Properties** tab.

To Configure a Wireless AP with the System's Default AP Settings:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. In the Wireless AP list, click the Wireless AP whose properties you want to modify. The **AP Properties** tab displays Wireless AP information.
3. To have the Wireless AP inherit the system's default AP settings, click **Reset to Defaults**. A pop-up dialog asking you to confirm the configuration change is displayed.
4. To confirm resetting the Wireless AP to the default settings, click **OK**.

NOTICE

If you reset an AP to defaults, its Search List will be deleted, regardless of the settings in Common Configuration.

Modifying the Wireless AP's Default Setting Using the Copy to Defaults Feature

You can modify the system's default AP settings by using the **Copy to Defaults** feature on the **AP Properties** tab. This feature allows the properties of an already configured Wireless AP to become the system's default Wireless AP settings.

To Modify the System's Default AP Settings Based on an Already Configured AP:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. In the Wireless AP list, click the Wireless AP whose properties you want to become the system's default AP settings. The **AP Properties** tab is displayed.
3. If applicable, modify the Wireless AP's properties. For more information, see "Configuring a Wireless AP's Properties" on page 3-21.
4. To make this Wireless AP's configuration be the system's default AP settings, click **Copy to Defaults**. A pop-up dialog asking you to confirm the configuration change is displayed.
5. To confirm resetting the system's default Wireless AP settings, click **OK**.

Configuring Multiple Wireless APs Simultaneously

In addition to configuring Wireless APs individually, you can also configure multiple Wireless APs simultaneously by using the **AP Multi-edit** function. Configuring Wireless APs simultaneously is similar to modifying the system's default AP settings or individual Wireless APs.

When selecting which Wireless APs to configure simultaneously, you can use the following criteria:

- Select the Wireless APs by hardware type

- Select the Wireless APs individually

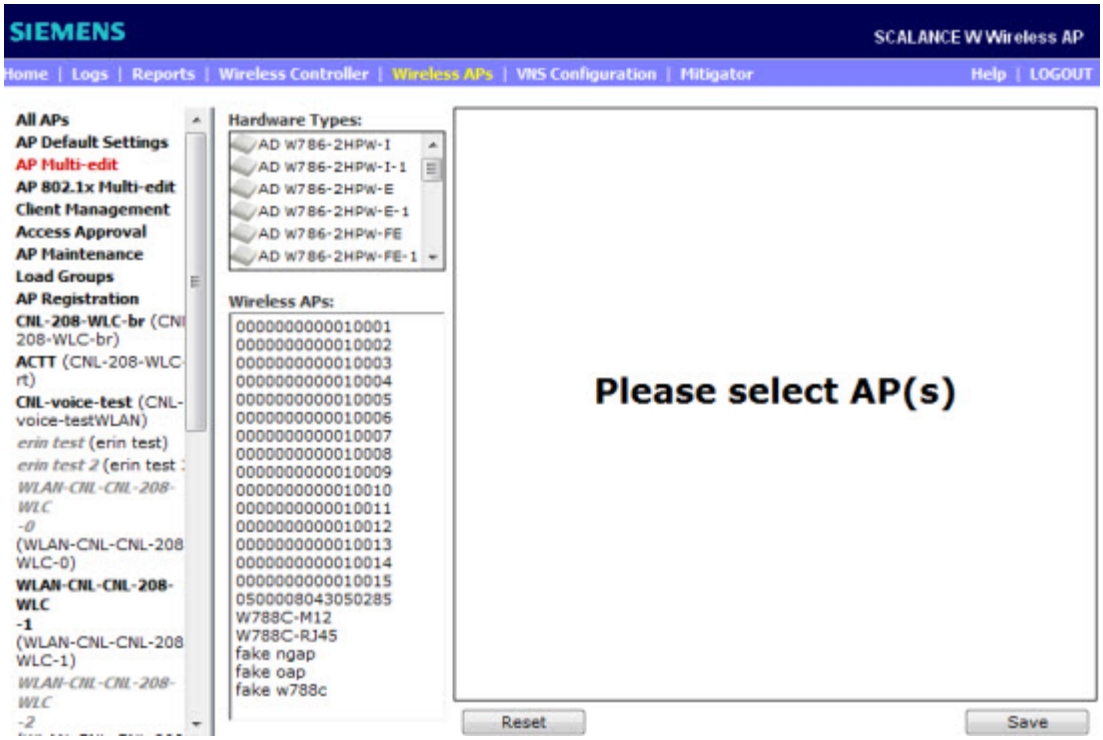
You can select multiple hardware types and individual Wireless APs by pressing the Ctrl key and selecting the hardware types and specific Wireless APs.

When you configure multiple Wireless APs using the **AP Multi-edit** screen, it is important to note that for some Wireless AP settings to be available for configuration, other Wireless AP settings must be enabled or configured first.

Note:
Only settings and options supported by all of the currently selected hardware types are available for configuring.

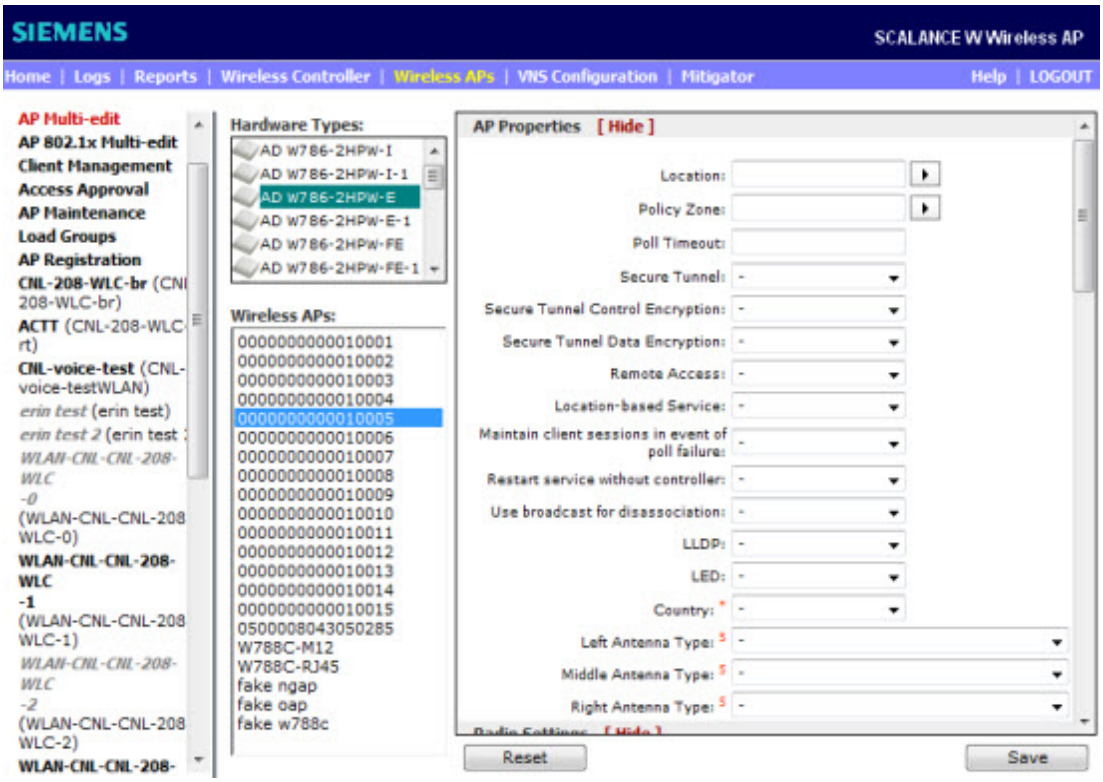
To Configure Wireless APs Simultaneously:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. In the left pane, click **AP Multi-edit**.



3. Do one of the following:
   – In the **Hardware Types** list, click one or more Wireless AP hardware types.

– In the **Wireless APs** list, click one or more Wireless APs to edit. To click multiple Wireless APs, click the APs from the list while pressing the CTRL key. The AP profile page displays.



Note:
When using the **Multi-edit** function, any box or option that is not explicitly modified will not be changed by the update.

The Wireless APs shown in the Wireless APs list can be from any version of the software. Attributes that are common between software versions are set on all Wireless APs. Attributes that are not common, are only sent to the AP versions to which the attributes apply. Attempting to set an attribute that does not apply for an AP will not abort the multi-edit operation.

Table 3-12 AP Multi-edit Properties

Field/Button	Description
Hardware Types	The Wireless AP hardware model.
Wireless APs	The name assigned to the Wireless AP.
AP Properties	For more information, see “Configuring a Wireless AP’s Properties” on page 3-21.
Radio Settings	For more information, see “Configuring Wireless AP Radio Properties” on page 3-26.
Static Configuration	

Table 3-12 AP Multi-edit Properties (continued)

Field/Button	Description
WLC Search List	Click one of the following: • **Clear search list** — Click to clear previously assigned SCALANCE IWLAN Controllers that were configured to control this Wireless AP. • **Re-configure search list** — Click to assign SCALANCE IWLAN Controllers to control this Wireless AP. This causes the Add box to become available.
Add box	Enter the IP address of the SCALANCE IWLAN Controller that will control this Wireless AP. This box is available only if you selected **Re-configure search list** when configuring the search list. Click the Add button to add the IP address to the list. Repeat to add additional SCALANCE IWLAN Controllers. The maximum is three SCALANCE IWLAN Controllers. Click **Up** and **Down** to modify the order of the SCALANCE IWLAN Controllers. The Wireless AP is successful when it finds a SCALANCE IWLAN Controller that will allow it to register. This feature allows the Wireless AP to bypass the discovery process. If the **WLC Search List** is not populated, the Wireless AP will use SLP unicast/multicast, DNS, or DHCP vendor option 43 to discover a SCALANCE IWLAN Controller. For the initial Wireless AP deployment, it is necessary to use one of the described options in “Discovery and Registration Overview” on page 3-9.
Tunnel MTU	Enter a static MTU value, from 600 to 1500. If the Siemens wireless software cannot discover the MTU size, it enforces the static MTU size. Set the MTU size to allow the source to reduce the packet size and avoid the need to fragment data packets in the tunnel.
WLAN Assignments	
WLAN Assignments	From the drop-down list, click one of the following: • **Clear WLAN list** — Click to clear previously assigned WLAN services of the Wireless APs. • **Re-configure WLAN list** — Click to assign WLAN services to the Wireless APs. In the **Radio 1** and **Radio 2** columns, select the Wireless AP radios that you want to assign for each WLAN service.
Save	Click to save your changes.

Configuring Co-located APs in Load Balance Groups

You can configure APs that are co-located in an open area, such as a classroom, a conference hall, or an entrance lobby, to act as a load balance group. Load balancing distributes clients across the co-located APs that are members of the load balance group. The co-located APs should provide the same SSID, have Line-of-Sight (LoS) between each other, and be deployed on multiple channels with overlapping coverage.

You must assign an AP's radio to the load balance group for the client distribution to occur. Load balancing occurs only among the assigned AP radios of the load balance group. Each radio can be assigned only to one load balance group. Multiple radios on the same AP do not have to be in the same load balance group. The radios that you assign to the load balance group must be on APs that are controlled by the same SCALANCE IWLAN Controller.

The load balance group uses one or more WLAN services for all APs assigned to the load balance group. You can configure two types of load balance groups:

You can configure two types of load groups:

- Client Balancing load group – preforms load balancing based on the number of clients across all APs in the group and only for the WLANs assigned to the load group. This is different from load control in the Radio Preference group— load control APs make decisions in isolation from each other.
- Radio Preference load group – performs band preference steering and load control. Band preference steering is a mechanism to move 11a-capable clients to the 11a radio on the AP, relieving congestion on the 11g radio. No balancing is done between the 11a and 11g radios. Load control is disabled by default. A radio load group executes band preference steering and/or load control across the radios on each AP in the group. Each AP balances in isolation from the other APs, but all APs in the load group have the same configuration related to the band preference and load control.

Client balancing on the SCALANCE IWLAN Controller is AP-centric and requires no input from the client. The AP radios in the client balance group share information with secure (AES) SIAPP (Siemens Inter-AP Protocol) messaging using multicast on the wired network. All APs in a client balance group must be in the same SIAPP cluster to ensure that each AP can reach all other APs in the client balance group over the wired subnet. If the APs in a client balance group are not in same SIAPP cluster, client balancing will happen independently within the subgroups defined by SIAPP clusters.

The benefits of configuring your co-located APs that are controlled by the same SCALANCE IWLAN Controller as a client balance group are the following:

- Resource sharing of the balanced AP
- Efficient use of the deployed 2.4 and 5 GHz channels
- Reduce client interference by distributing clients on different channels
- Scalable 802.11 deployment: if more clients need to be served in the area, additional APs can be deployed on a new channel

You can assign a maximum of 32 APs to a client balance group. Table 3-13 lists the maximum number of load balance groups for each SCALANCE IWLAN Controller.

Table 3-13 Maximum Number of Load Balance Groups

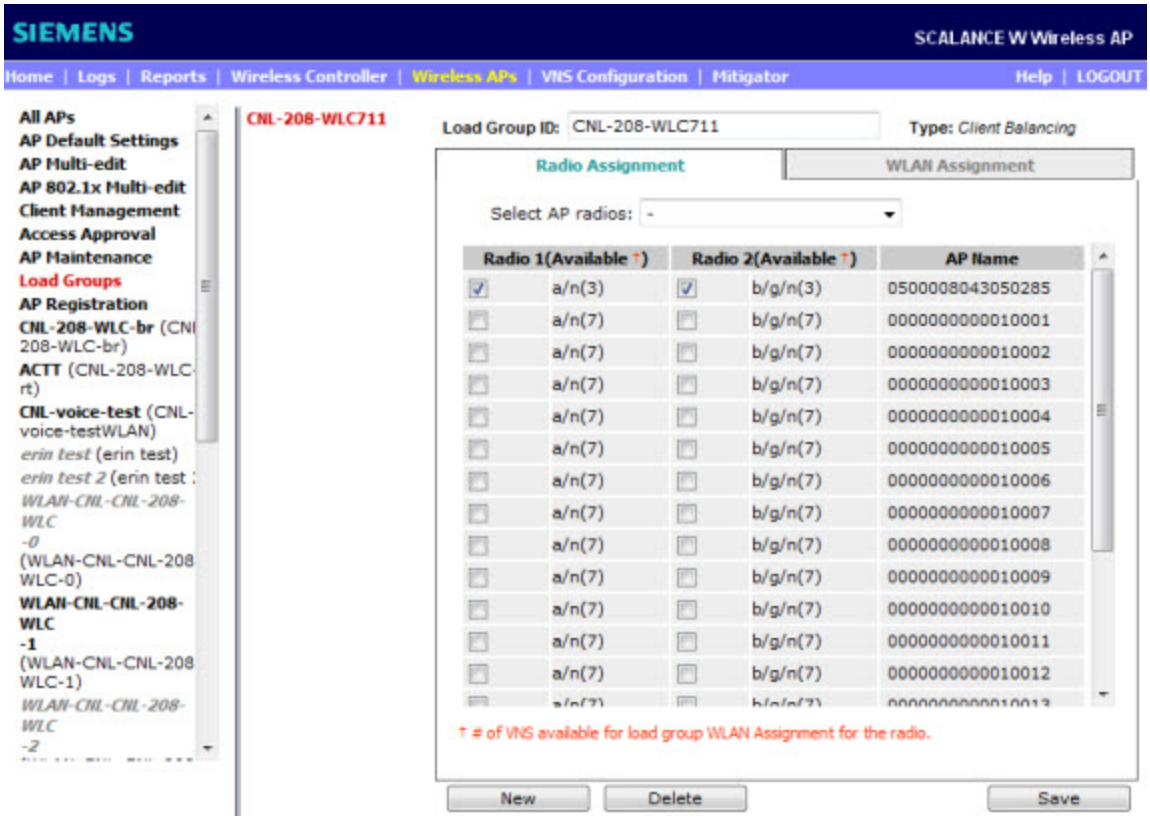
SCALANCE IWLAN Controller	Number of load balance groups
WLC711	8

Currently, the following Wireless AP models support load balance groups:

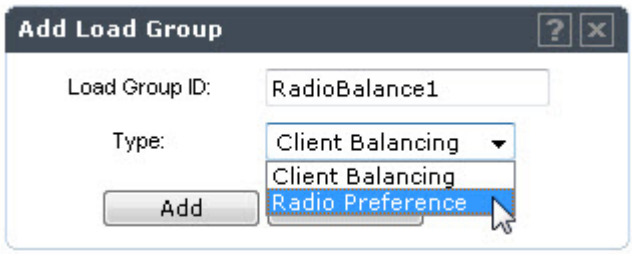
- SCALANCE W786C-2 RJ45
- SCALANCE W786C-2IA RJ45
- SCALANCE W788C-2 RJ45
- SCALANCE W788C-2 M12

To Create a Load Balance Group

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. In the left pane, click **Load Groups**. The **Wireless AP Load Groups** page displays.



3. Click **New**. The **Add Load Group** window displays.



If you are adding a Radio Preference load balancing group, the Radio Preference tab becomes available.

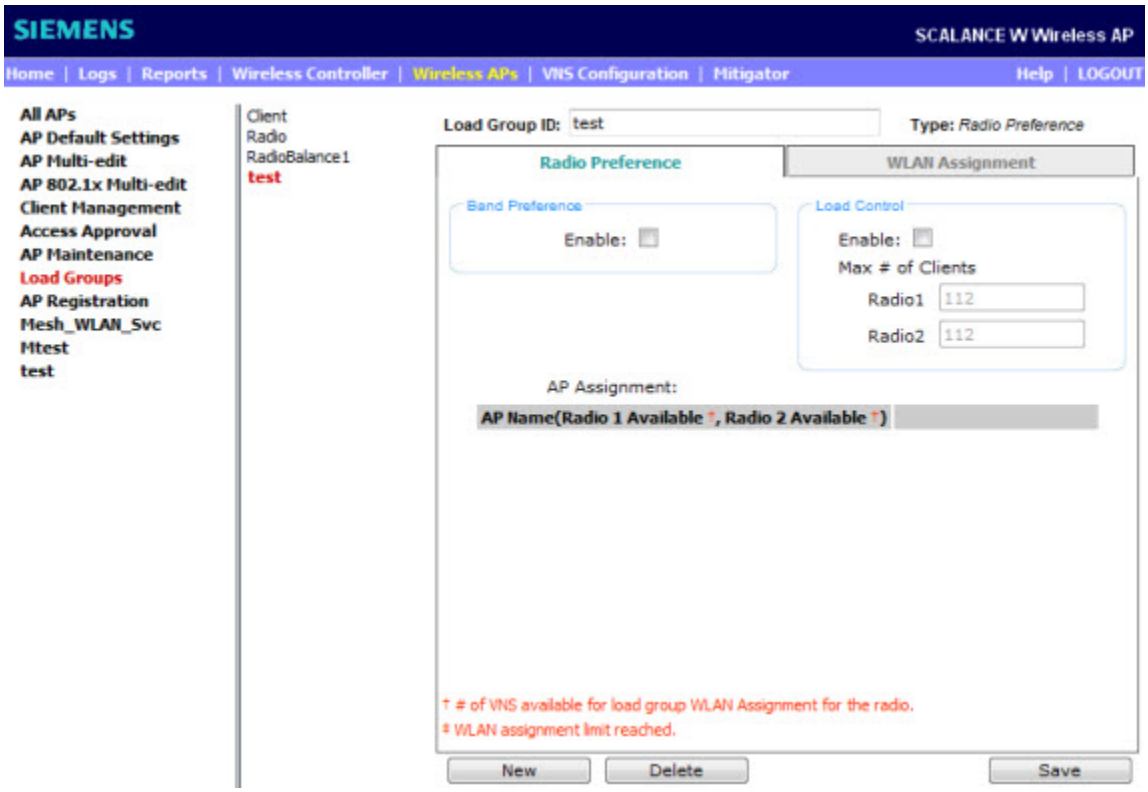


Table 3-14 AP Load Groups

Field/Button	Description
Load Group ID	Enter a unique name for the load group. You can create load groups with the same name on different SCALANCE IWLAN Controllers; however, the groups will be treated as separate groups according to the home controller where the group was originally created.
Type	The type of load group is displayed. Options include: • Client Balancing - select to perform load balancing based on the number of clients across all APs in the load balance group and only for the WLANs assigned to the group. • Radio Preference - select to perform band preference steering and enforce load control settings on this load group.
New	Click to create a new load group. The Add Load Group window.
Delete	Click to delete this load group.
Save	Click to save your changes.

Table 3-14 AP Load Groups (continued)

Field/Button	Description
Radio Assignment tab - this tab is available only for load groups assigned the Client Balancing type	
Select AP Radios	From the drop-down menu, select the AP radios that you want to assign to the load group. Options include: • All radios • Radio 1 • Radio 2 • Clear all radios You can assign a radio to only one load balance group. A radio that is assigned to another load balance group will have an asterisk next to it. If you select a radio that has been assigned to another load balance group, the radio is reassigned to the new load balance group. **Note:** You can assign each radio of an AP to different load balance groups.
Radio Preference tab - this tab is available only for load groups assigned the Radio Preference type	
Band Preference	Select the Enable checkbox to enable band preference for this load group. For the 802.11n models only, you can apply band preference only to a VNS assigned in the load group. Enabling band preference enables you to move an 11a-capable client to an 11a radio to relieve congestion on an 11g radio. A client is considered 11a capable if the AP receives requests on an 11a VNS that already belongs to a load group with band preference enabled. After you configure band preference, if a client tries to reassociate with an 11g radio, it will be rejected if the AP determines that the client is 11a capable.
Load Control	Select the following parameters for each radio assigned to this load group: **Enable:** Select this checkbox to enable Radio Load Control (RLC) for individual radios (Radio1 and Radio2) associated with this Load Group. **Max. # of Clients:** Enter the maximum number of clients for Radio 1 and Radio 2. The default limit is 60. The valid range is: 5 to 60. **Strict Limit:** Select this checkbox to enable a strict limit on the number of clients allowed on a specific radio, based on the max # of clients allowed. Limits can be enforced separately for radio1 and radio 2.
AP Assignment	Select the APs on which you want to enforce the Band Preference and Load Control settings.

Table 3-14 AP Load Groups (continued)

Field/Button	Description
WLAN Assignment tab	
WLAN Name	Click the checkbox of the one or more WLAN services that you want to assign to all member radios of the load balance group. You can select up to the radio limit of eight VNSs. When you assign a radio to a load group, WLAN service assignment can only be done from the **WLAN Assignment** tab on the **Wireless AP Load Groups** screen. On all other **WLAN Assignment** tabs associated with the member AP radios, the radio checkbox associated with the member AP radios will be grayed out. When you remove a radio from a load group, the load group's WLAN service will remain assigned to the radio, but you can now assign a different WLAN service to the radio.
Add Load Group Window	
Load Group ID	Enter a unique name for this load group.
Type	From the drop-down menu, select the type of load balancing to be used for this load group. Options are: • Client Balancing • Radio Preference
Add	Click to add this new load group. The new load group is the currently displayed load group in the Wireless AP Load Groups screen. After you add the new load group, navigate to the Radio Preference and WLAN Assignment tabs to assign radios and one or more WLAN services to the load group.
Cancel	Click to discard the new load group configuration

How Availability Affects Load Balancing

All radios assigned to a load group must belong to APs that are all controlled by the same SCALANCE IWLAN Controller. If you have enabled availability configuration of a load group is only possible from the home controller where the load group was created. Load balancing will continue to operate if member APs fail over to the foreign controller as long as the WLAN service assignment remains the same.

To ensure that load balancing works properly in availability, you should enable synchronization of the system configuration and the WLAN services used by the load group when you configure availability. If you do not enable synchronization, the radios on any AP that fails over may be removed from their assigned load groups. For more information, see "Configuring Availability Using the Availability Wizard" on page 12-3.

If you have not configured synchronization, in a failover situation you will be able to change the load balance group's WLAN service assignment from the **VNS Configuration** screens and the **Wireless AP's WLAN Assignment** screens on the foreign controller.

Note:
If you have configured synchronization, you cannot change the WLAN assignments from the foreign controller.

If you have not configured synchronization, you must configure the foreign controller to ensure that all AP radios in the load balance group have the same WLAN services assigned before the AP fails over, as originally configured for the load group. If the WLAN services assigned do not match when an AP fails over, the affected AP radios will be removed from the load group. If you change the WLAN services to match after the AP fails over, the AP radios still will not be allowed to be in the load group. You must reconnect the AP to the home controller to have the radios become part of the load group again.

Load Balance Group Statistics

You can view load balance group statistics through the **Active Wireless Load Groups** report. For more information, see "Viewing Load Balance Group Statistics" on page 16-6.

Configuring an AP Cluster

APs operating in both fit mode and standalone mode operate in a cluster setup. A cluster is a group of Wireless APs configured to communicate with each other. Mobile users (MU) can seamlessly roam between the APs participating in the cluster. The Siemens Wireless AP extends basic cluster functionality with the following enhancements:

- Support for fast roaming
- Automatic Channel Selection (ACS) for all APs in the cluster
- Cluster member information is available to the user
- MU statistic history
- Pre-authentication

A cluster forms when APs operating are within the same subnet and multicast and IGMP snooping are enabled. The APs in the cluster use a default cluster ID (shared secret) or a cluster ID that you assign.

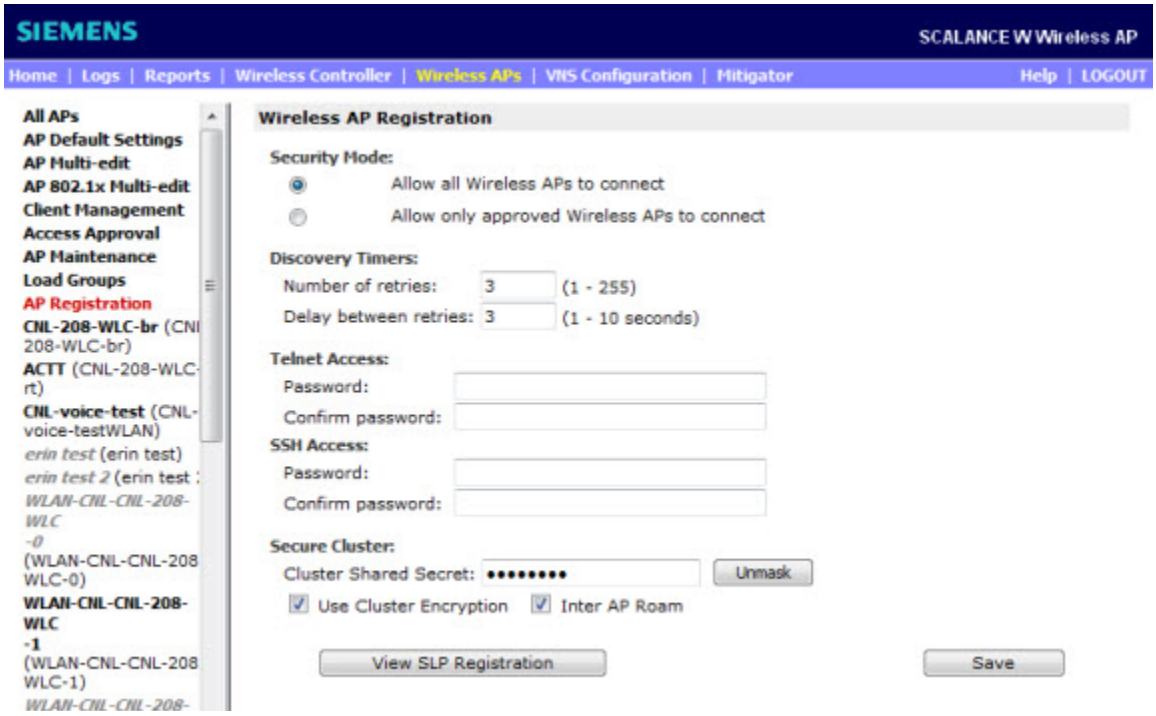
An AP cluster can exist at any point in your network. Each cluster member periodically (30 seconds) sends a secure SIAPP (Siemens Inter-AP Protocol) multicast message to update other cluster members. The SIAPP message includes:

- The AP name
- The AP Ethernet MAC address
- The AP IP address
- The client count
- The base BSSIDs for both radios

Each AP caches locally stored information about other cluster members and maintains its own view of the cluster.

To Change an AP Cluster's Configuration:

1. From the top menu, click **Wireless APs**. The Wireless AP screen is displayed.
2. In the left pane, click **AP Registration**. The **AP Registration** screen is displayed.



3. In the **Secure Cluster** section, enter a cluster shared secret.
4. Enable cluster encryption by clicking on the **User Cluster Encryption** checkbox. APs on which user cluster encryption is disabled cannot participate in the cluster.
5. Enable or disable support for inter-AP roaming by clicking on the **Inter AP Roam** checkbox.
6. Click **Save**.

Performing Wireless AP Software Maintenance

When a new version of AP software becomes available, you can install it from the SCALANCE IWLAN Controller.

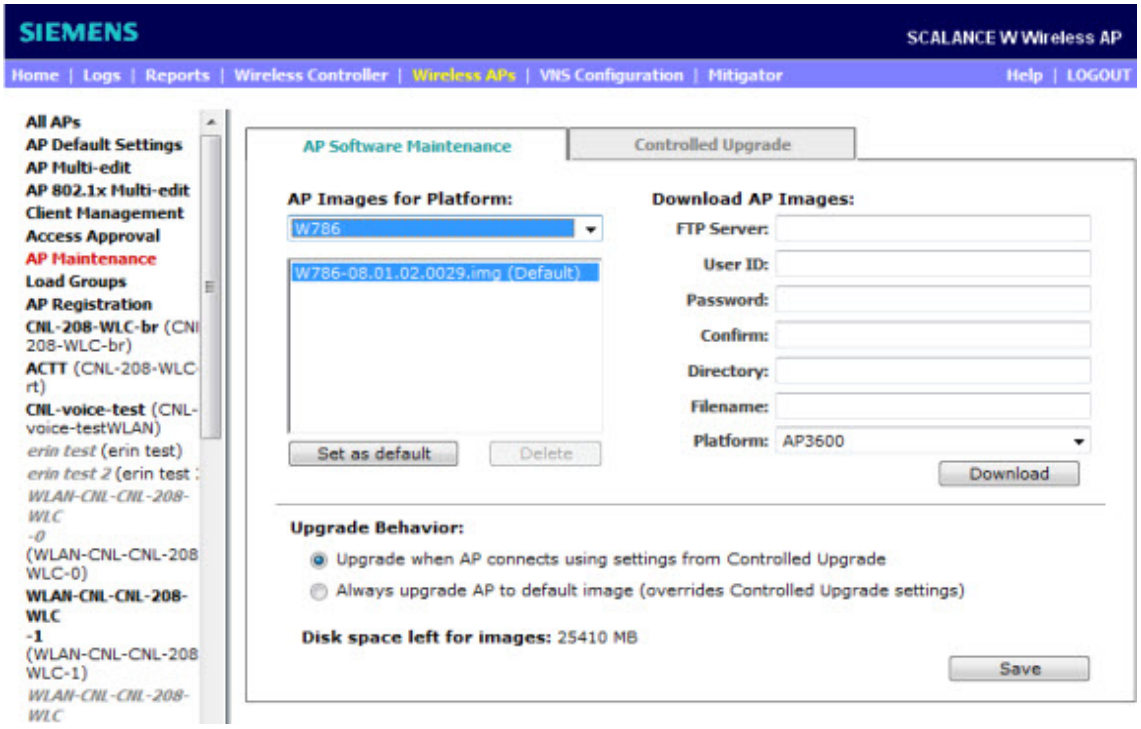
You can configure each Wireless AP to upload the new software version either immediately, or the next time the Wireless AP connects to the controller. Part of the Wireless AP boot sequence seeks and install its software from the SCALANCE IWLAN Controller.

You can modify most of the radio properties on a Wireless AP without requiring a reboot of the AP.

During upgrade, the Wireless AP keeps a backup copy of its software image. When a software upgrade is sent to the Wireless AP, the upgrade becomes the Wireless AP's current image and the previous image becomes the backup. In the event of failure of the current image, the Wireless AP will run the backup image.

To Maintain the List of Current Wireless AP Software Images:

1. From the top menu, click **Wireless APs**. The **Wireless APs** screen is displayed.
2. In the left pane, click **AP Maintenance**. The **AP Software Maintenance** tab is displayed.



3. In the **AP Images for Platform** drop-down list, click the appropriate platform.
4. To select an image to be the default image for a software upgrade, click it in the list, and then click **Set as default**.
5. In the **Upgrade Behavior** section, select one of the following:
   - **Upgrade when AP connects using settings from Controlled Upgrade** — The **Controlled Upgrade** tab is displayed when you click **Save**. Controlled upgrade allows you to individually select and control the state of an AP image upgrade: which APs to upgrade, when to upgrade, how to upgrade, and to which image the upgrade or downgrade should be done. Administrators decide on the levels of software releases that the equipment should be running.
   - **Always upgrade AP to default image (overrides Controlled Upgrade settings)** — Selected by default. Allows for the selection of a default revision level (firmware image) for all APs in the domain. As the AP registers with the controller, the firmware version is verified. If it does not match the same value as defined for the default-image, the AP is automatically requested to upgrade to the default-image.
6. To save your changes, click **Save**.

To Delete a Wireless AP Software Image:

1. From the top menu, click **Wireless APs**. The Wireless AP **Configuration** screen is displayed.
2. In the left pane, click **AP Maintenance**. The **AP Software Maintenance** tab is displayed.
3. In the **AP Images for Platform** drop-down list, click the appropriate platform.

4. In the **AP Images** list, click the image you want to delete.
5. Click **Delete**. The image is deleted.

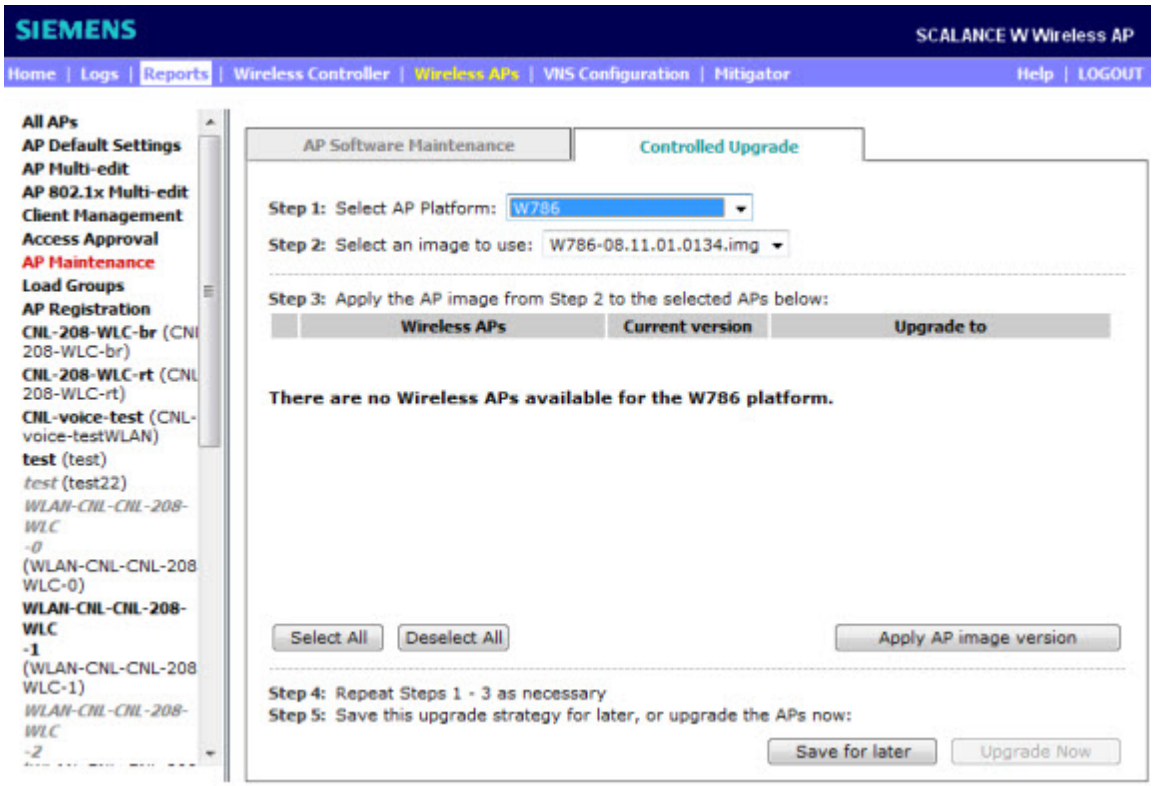
To Download a New Wireless AP Software Image:

1. From the top menu, click **Wireless APs**. The Wireless AP **Configuration** screen is displayed.
2. In the left pane, click **AP Maintenance**. The **AP Software Maintenance** tab is displayed.
3. In the **Download AP Images** list, type the following:
   - **FTP Server —** The IP of the FTP server to retrieve the image file from.
   - **User ID —** The user ID that the controller should use when it attempts to log in to the FTP server.
   - **Password —** The corresponding password for the user ID.
   - **Confirm —** The corresponding password for the user ID to confirm it was typed correctly.
   - **Directory —** The directory on the server in which the image file that is to be retrieved is stored.
   - **Filename —** The name of the image file to retrieve.
   - **Platform —** The AP hardware type to which the image applies. The are several types of AP and they require different images.
4. Click **Download**. The new software image is downloaded.

To Define Parameters for a Wireless AP Controlled Software Upgrade:

1. From the top menu, click **Wireless APs**. The Wireless AP **Configuration** screen is displayed.
2. In the left pane, click **AP Maintenance**. The **AP Software Maintenance** tab is displayed.

3. Click the **Controlled Upgrade** tab.


SIEMENS
SCALANCE W Wireless AP
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator | Help | LOGOUT
All APs
AP Default Settings
AP Multi-edit
AP 802.1x Multi-edit
Client Management
Access Approval
AP Maintenance
Load Groups
AP Registration
CNL-208-WLC-br (CNL-208-WLC-br)
CNL-208-WLC-rt (CNL-208-WLC-rt)
CNL-voice-test (CNL-voice-testWLAN)
test (test)
test (test22)
WLAN-CNL-CNL-208-WLC-0 (WLAN-CNL-CNL-208-WLC-0)
WLAN-CNL-CNL-208-WLC-1 (WLAN-CNL-CNL-208-WLC-1)
WLAN-CNL-CNL-208-WLC-2
AP Software Maintenance
Controlled Upgrade
Step 1: Select AP Platform: W786
Step 2: Select an image to use: W786-08.11.01.0134.img
Step 3: Apply the AP image from Step 2 to the selected APs below:
Wireless APs
Current version
Upgrade to
There are no Wireless APs available for the W786 platform.
Select All
Deselect All
Apply AP image version
Step 4: Repeat Steps 1 - 3 as necessary
Step 5: Save this upgrade strategy for later, or upgrade the APs now:
Save for later
Upgrade Now

Note:
The **Controlled Upgrade** tab is displayed only when the **Upgrade Behavior** is set to **Upgrade when AP connects using settings from Controlled Upgrade** on the **AP Software Maintenance** tab.

4. In the **Select AP Platform** drop-down list, click the type of AP you want to upgrade.
5. In the **Select an image to use** drop-down list, click the software image you want to use for the upgrade.
6. In the list of registered **Wireless APs**, select the checkbox for each Wireless AP to be upgraded with the selected software image.
7. Click **Apply AP image version**. The selected software image is displayed in the **Upgrade To** column of the list.
8. To save the software upgrade strategy to be run later, click **Save for later**.
9. To run the software upgrade immediately, click **Upgrade Now**. The selected Wireless AP reboots, and the new software version is loaded.

Note:
The **Always upgrade AP to default image** checkbox on the **AP Software Maintenance** tab overrides the **Controlled Upgrade** settings.

4

Configuring Topologies

This chapter describes topology configuration, including:

For information about...	Refer to page...
Topology Overview	4-1
Configuring the Admin Port	4-2
Configuring a Basic Data Port Topology	4-4
Enabling Management Traffic	4-5
Layer 3 Configuration	4-6
Exception Filtering	4-11
Multicast Filtering	4-15

Topology Overview

There are two types of topologies: Admin port and data port. The Admin port topology is fairly restrictive to what can be configured (IP address, default gateway and so on). The data port topology supports more configurations.

A data topology configuration is independent of the WLAN services or Policies that are defined in the system. You can navigate to the Topologies configuration page from either Wireless Controller or VNS Configuration options of the SCALANCE W Wireless Assistant top menu. Also, the Policy definition page allows the user to edit or create a Topology definition at any time.

Data topologies are not activated until they are referenced by a Policy. Creating an interface on a VLAN will not take effect until a Policy references its usage.

Data topologies cannot be deleted while they are active (that is, referenced by a Policy).

On the **Topologies** configuration page, the key field is the **Mode**, which determines some of the other factors of the topology. When you have completed defining the topology for your VNS, save the topology settings. Once your topology is saved, you can then access the remaining VNS tabs and continue configuring your VNS.

On the **Topologies** configuration page, a number of parameters related to network topology can be defined:

- VLAN ID and associated L2 port
- L3 (IP) interface presence and the associated IP address and subnet range
- The rules for using DHCP
- Enabling or disabling the use of the associated interface for management/control traffic

- Selection of an interface for AP registration
- Multicast filter definition
- Exception filter definition

"Physical Ports" refers to the data plane physical ports. The attributes of a physical port are:

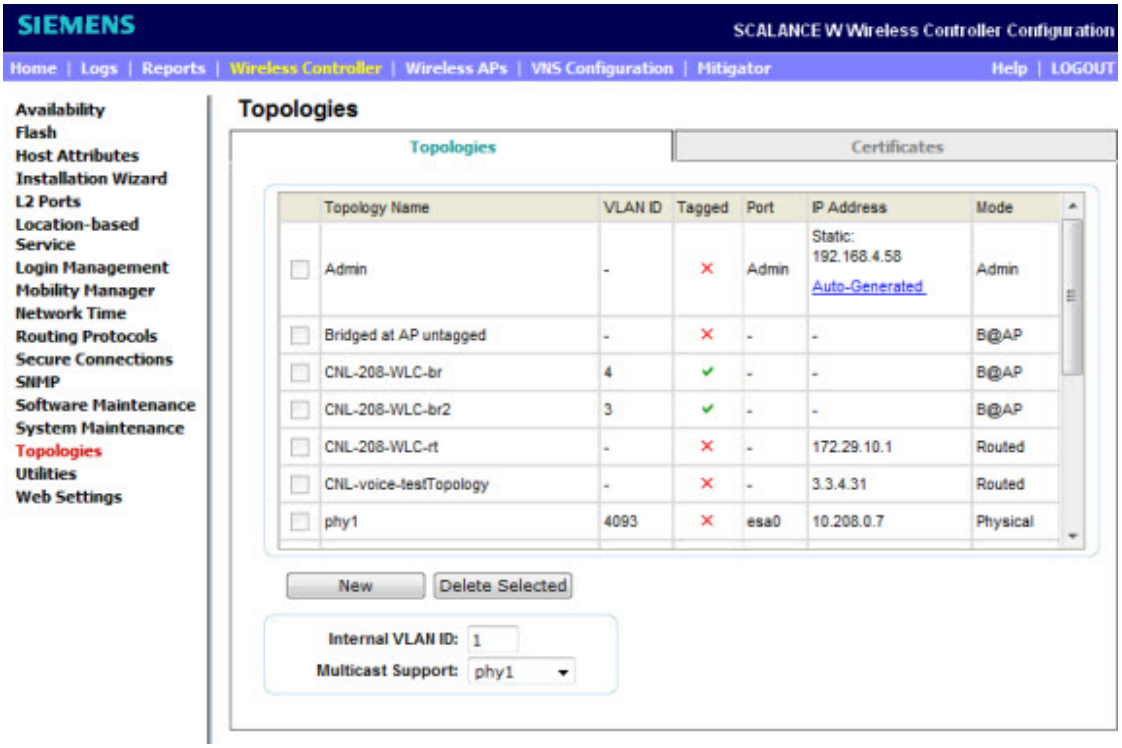
- Administrative status (read-write)
- Name (read-only)
- MAC address (read-only)
- MTU size
- Multicast Support for Routed VNS

At most, one physical topology can be enabled for the multicast support for Routed VNS. This can be configured on the new physical port GUI.

Configuring the Admin Port

The Admin port is a physical ethernet port directly connected to the controller's management plane. As it's name suggests, it is intended to provide a dedicated connection to a secure management VLAN. The controller can use the Admin port to interact with RADIUS, SNMP, NTP and NetSight servers.

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **Topologies**. The **Topologies** tab is displayed.



3. To change any of the associated Admin parameters, click on the Admin topology entry. An "Edit Topology" pop up window appears.

4. Under Core, the Admin port **Name** and **Mode** are not configurable.
5. Under Layer 3 - IPv4, the following settings are available:
   - The **Static IP Address** specifies the address assigned by the administrator.
   - In the **Mask** field, type the appropriate subnet mask for the IP address (typically, 255.255.255.0).
   - The **MTU** value specifies the Maximum Transmission Unit or maximum packet size for this topology. The fixed value is 1500 bytes for physical topologies.
   - The **Gateway** field specifies the IP address of the default gateway for the Admin port.
6. Under Layer 3 - IPv6, the following settings are available:
   - The **Static IPv6 Address** field specifies the address assigned by the administrator.
   - The **Static IPv6 Gateway** field specifies the IP address of the default gateway for the Admin port.
   - The **Prefix Length** field specifies the length of the IPv6 prefix. Maximum is 64 bits.
   - The **MTU** value specifies the Maximum Transmission Unit or maximum packet size for this topology. The fixed value is 1500 bytes for physical topologies.
   - The **Dynamic IP Address** lists the current auto-generated IPv6 addresses assigned to the Admin port.

Note:
IPv6 supports multiple addresses on the same port including auto-generated addresses such as a link-local address, or an address created by combining the Router Advertisement prefix with the interface ID. Auto-generated addresses generated via the Router Advertisement prefix are dynamic and their availability depends on the existence of the prefix (or lack of) in the Router Advertisement.

- Click **Refresh** to refresh the list of Dynamic IP Addresses.

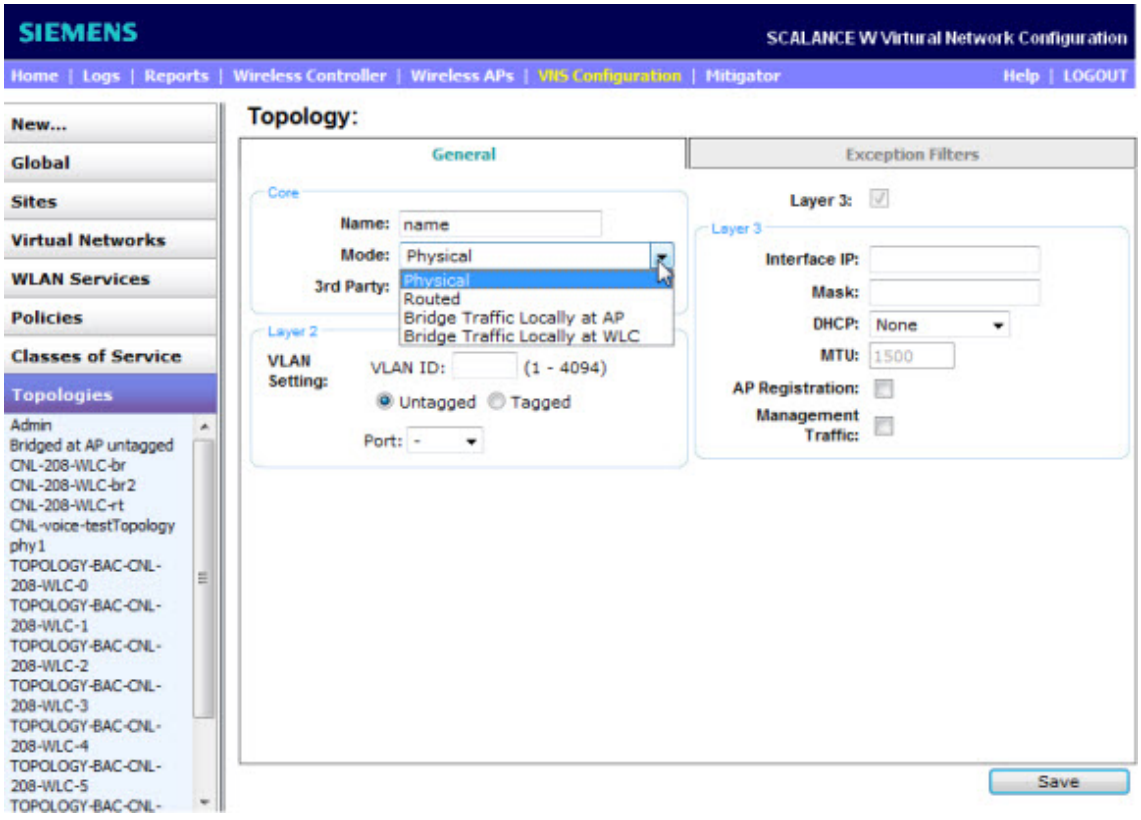
7. Click **Save** to save your changes.
8. Click **Cancel** to close the Edit Topology dialog without saving any changes to the port configuration.

Configuring a Basic Data Port Topology

The configuration procedure below is sufficient to create and be able to save a new topology. Optional configuration options are described in the following sections.

To Configure a Basic Topology:

1. From the top menu, click either **Wireless Controller** or **VNS Configuration**. Then, in the left pane, select **Topologies**. The Topologies window displays.
2. If you want to edit an existing topology, select the desired topology. If you want to create a new topology, click the **New** button. Depending on your selection, two or three tabs are displayed.



3. On the General tab, enter a name for the topology in the **Name** field.

4. Select a mode of operation from the **Mode** drop-down list. Choices are:
   - **Physical**
   - **Routed** — Routed topologies do not need any Layer 2 configuration, but do require Layer 3 configuration. See "Layer 3 Configuration" on page 4-6 for more information.
   - **Bridge Traffic Locally at AP** — Requires Layer 2 configuration. Does not require Layer 3 configuration. Bridge Traffic at the AP VNSs do not require the definition of a corresponding IP address since all traffic for users in that VNS will be directly bridged by the Wireless AP at the local network point of attachment (VLAN at AP port).
   - **Bridge Traffic Locally at WLC** — Requires Layer 2 configuration. May optionally have Layer 3 configuration. Layer 3 configuration would be necessary if services (such as DHCP, captive portal, etc.) are required over the configured network segment, or if controller management operations are intended to be done through the configured interface.
5. Configure the Layer 2 **VLAN Settings**, depending on the previously selected Mode.
   - For **Physical**, enter a VLAN identifier (1 - 4094), with at least one layer 2 member port (no mu associated).
   - For **Bridge Traffic Locally at WLC**, enter a VLAN identifier (1 - 4094) that is valid for your system and enter the port to which this VLAN is attached to, according to the networking deployment model pre-established during planning.
   - For **Bridge Traffic Locally at AP,** enter a VLAN identifier (1 - 4094) that is valid for your system.
   - Specify whether the VLAN configuration is **Tagged** or **Untagged**.
   - For **Port,** select the Physical (Ethernet) or Link Aggregation (LAG) data port. For more information, see Viewing and Changing the L2 Ports Information.
6. To replicate topology settings, click **Synchronize** in the **Status** box.
7. Click **Save** to save your changes.

These steps are sufficient to create and save a topology. The following configuration options are optional and depend on the mode of the topology.

Enabling Management Traffic

If management traffic is enabled for a VNS, it overrides the built-in exception filters that prohibit traffic on the SCALANCE IWLAN Controller data interfaces. For more information, see Filtering Rules.

To Enable Management Traffic for a Topology:

1. From the top menu, click either **Wireless Controller** or **VNS Configuration**. Then, in the left pane, select **Topologies**. The Topologies window displays.
2. Select the desired physical or routed topology. If the Layer 3 parameters are not displayed, check the **Layer 3** checkbox.
3. Select the **Management Traffic** checkbox.
4. To save your changes, click **Save**.

Layer 3 Configuration

This section describes configuring IP addresses, DHCP options, Next Hop and OSPF parameters, for Physical port, Routed, and Bridge Traffic Locally at WLC topologies.

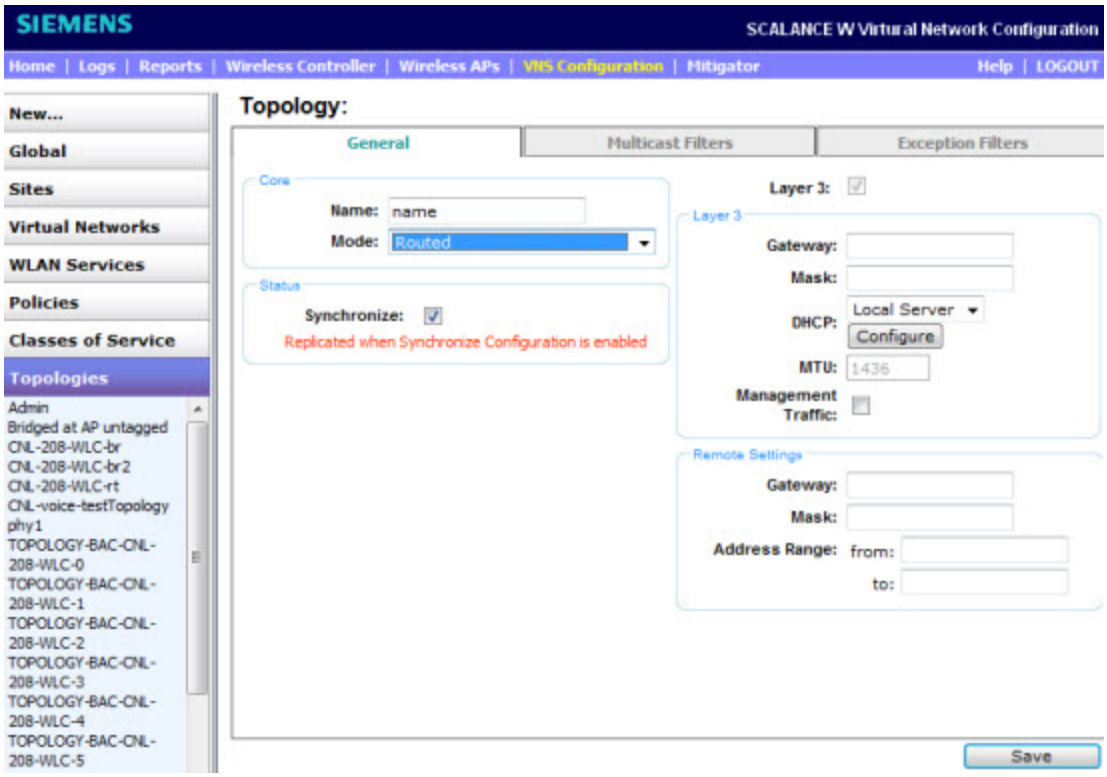
IP Address Configuration

The L3 (IP) address definition is only required for Physical port and Routed topologies. For Bridge Traffic Locally at WLC topologies, L3 configuration is optional. L3 configuration would be necessary if services such as DHCP, captive portal, AP registration (with up to 4 toplogies) are required over the configured network segment or if controller management operations are intended to be done through the configured interface.

Bridge Traffic Locally at AP VNSs do not require the definition of a corresponding IP address since all traffic for users in that VNS will be directly bridged by the Wireless AP at the local network point of attachment (VLAN at AP port).

To Define the IP Address for the Topology:

1. From the top menu, click **Wireless Controller** and then from the left pane select **Topologies**. Alternatively, from the top menu select **VNS Configuration** and then press **Topologies** button.
2. If already defined, click the topology you want to define the IP address for. The **Topologies** window is displayed. Alternatively, press the New button to create a new topology. Depending on the preselected options, two or three tabs are displayed.



3. For IP interface configuration for **Routed** topologies, configure the following Layer 3 parameters.

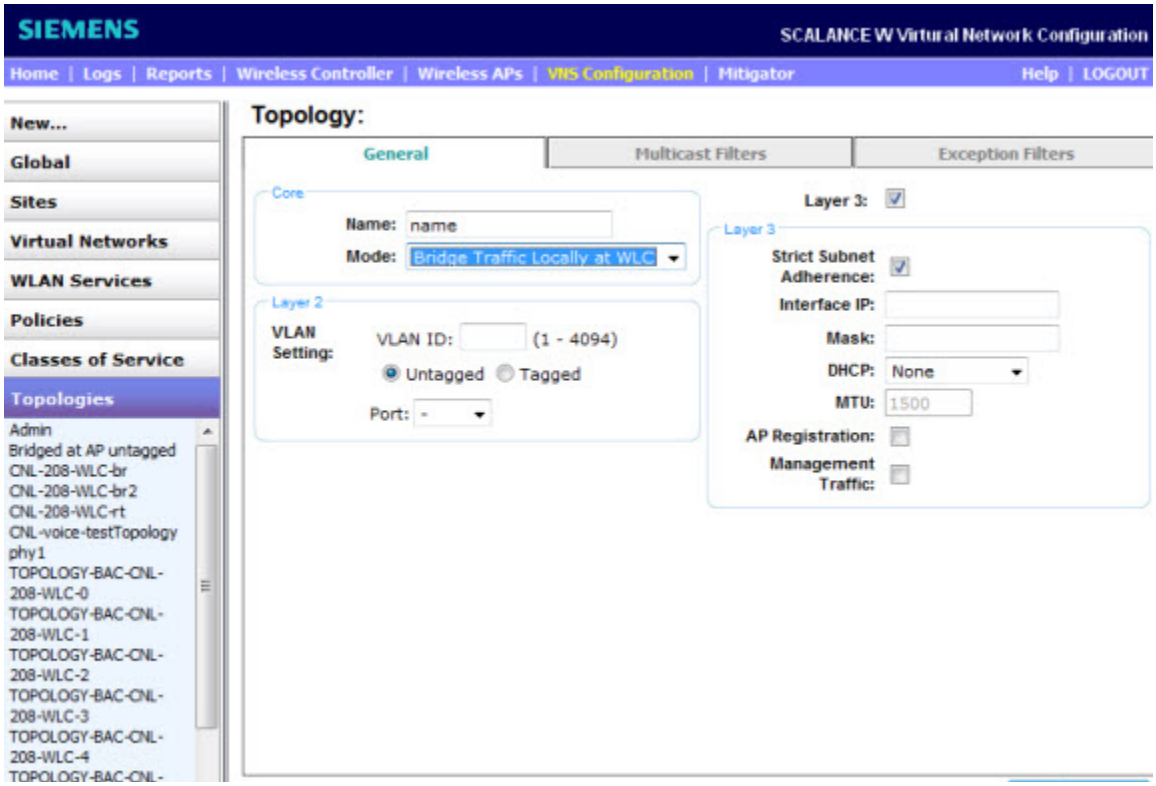
a. In the **Gateway** field, type the SCALANCE IWLAN Controller's own IP address in that VNS. This IP address is the default gateway for the VNS. The SCALANCE IWLAN Controller advertises this address to the wireless devices when they sign on. For routed VNSs, it corresponds to the IP address that is communicated to MUs (in the VNS) as the default gateway for the VNS subnet. (MUs target the SCALANCE IWLAN Controller's interface in their effort to route packets to an external host).

Note: The Gateway field supports both IPv4 or IPv6 addresses.

b. In the **Mask** field, type the appropriate subnet mask for the IP address. to separate the network portion from the host portion of the address (typically, 255.255.255.0).

c. If desired, enable Management traffic.

4. For IP interface configuration for **Bridge Traffic Locally at WLC topologies**, configure the following Layer 3 parameters.



a. In the **Interface IP** field, type the IP address that corresponds to the SCALANCE IWLAN Controller's own point of presence on the VLAN. In this case, the controller's interface is typically not the gateway for the subnet. The gateway for the subnet is the infrastructure router defined to handle the VLAN.

b. In the **Mask** field, type the appropriate subnet mask for the IP address. to separate the network portion from the host portion of the address (typically, 255.255.255.0).

c. Configure Strict Subnet Adherence.

d. If desired, configure AP Registration. If selected, Wireless APs can use this port for discovery and registration.

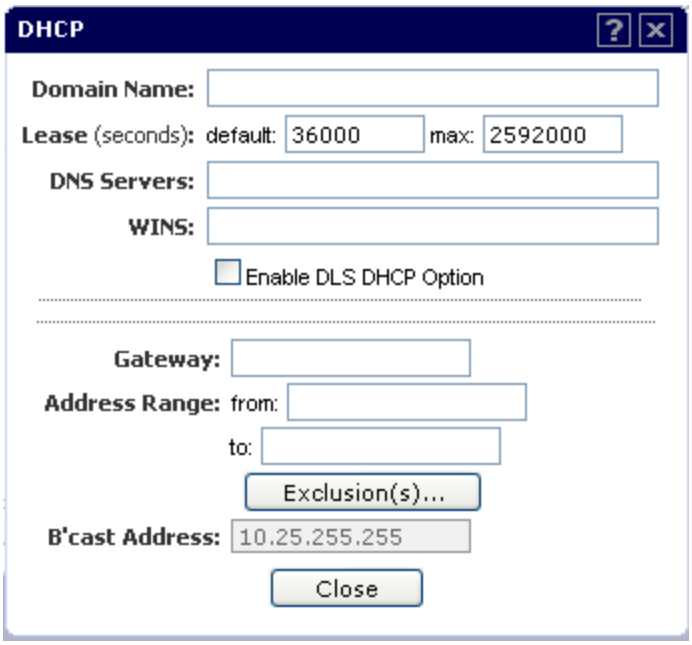
e. If desired, enable Management traffic.

DHCP Configuration

You can configure DHCP settings for all modes except **Bridge Traffic Locally at AP** mode since all traffic for users in that VNS will be directly bridged by the Wireless AP at the local network point of attachment (VLAN at AP port). DHCP assignment is disabled by default for Bridged to VLAN mode. However, you can enable DHCP server/relay functionality to have the controller service the IP addresses for the VLAN (and wireless users).

To Configure DHCP Options:

1. Navigate to the Topology page.
2. On the Topology page, click the General tab and enable Layer 3.
3. From the **DHCP** drop-down list, select one of the following options and click the **Configure** button.
   - **Local Server** if the SCALANCE IWLAN Controller's local DHCP server is used for managing IP address allocation.
   - **Use Relay** if the SCALANCE IWLAN Controller forwards DHCP requests to an external DHCP server on the enterprise network. DHCP relay bypasses the local DHCP server for the SCALANCE IWLAN Controller and allows the enterprise to manage IP address allocation to a VNS from its existing infrastructure.
4. If you selected **Local Server**, the following window displays. Configure the following parameters:



   a. In the **Domain Name** box, type the external enterprise domain name server to be used.
   b. In the **Lease default** box, type the default time limit. The default time limit dictates how long a wireless device can keep the DHCP server assigned IP address. The default value is 36000 seconds (10 hours).
   c. In the **DNS Servers** box, type the IP Address of the Domain Name Servers to be used.
   d. In the **WINS** box, type the IP address if the DHCP server uses Windows Internet Naming Service (WINS).

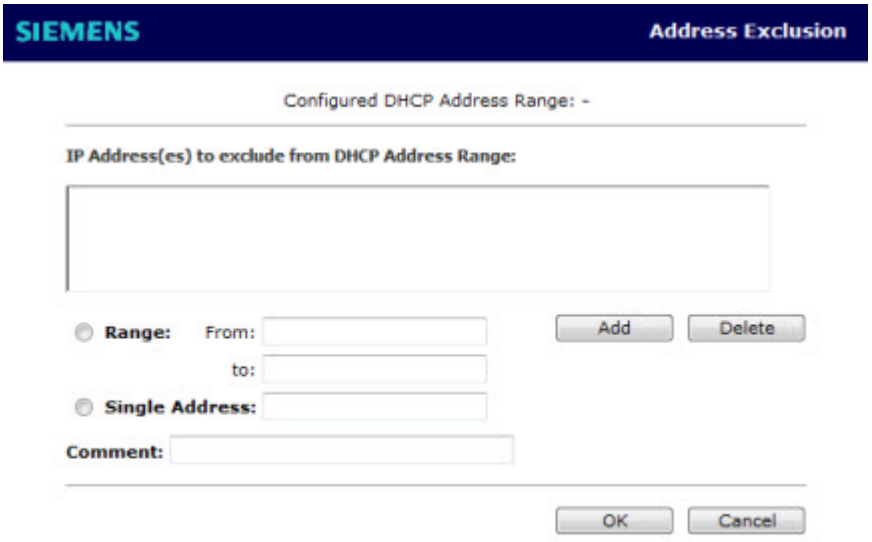
e. Check the **Enable DLS DHCP Option** checkbox if you expect optiPoint WL2 wireless phone traffic on the VNS. DLS is a Siemens application that provides configuration management and software deployment and licensing for optiPoint WL2 phones.

f. In the **Gateway** field, type the SCALANCE IWLAN Controller's own IP address in that topology. This IP address is the default gateway for the topology. The Controller advertises this address to the wireless devices when they sign on. For routed topologies, it corresponds to the IP address that is communicated to Wireless clients as the default gateway for the subnet. (wireless clients target the SCALANCE IWLAN Controller's interface in their effort to route packets to an external host).

   For a Bridge traffic locally at the WLC topology, the IP address corresponds to the SCALANCE IWLAN Controller's own point of presence on the VLAN. In this case, the controller's interface is typically not the gateway for the subnet. The gateway for the subnet is the infrastructure router defined to handle the VLAN.

g. The **Address Range** boxes (from and to) populate automatically with the range of IP addresses to be assigned to wireless devices using this VNS, based on the IP address you provided.

   - To modify the address in the **Address Range from** box, type the first available address.
   - To modify the address in the **Address Range to** box, type the last available address.
   - If there are specific IP addresses to be excluded from this range, click **Exclusion(s)**. The **DHCP Address Exclusion** dialog is displayed.



– In the **DHCP Address Exclusion** dialog, do one of the following:

   - To specify an IP range, type the first available address in the **From** box and type the last available address in the **to** box. Click **Add** for each IP range you provide.
   - To specify an IP address, select the **Single Address** option and type the IP address in the box. Click **Add** for each IP address you provide.
   - To save your changes, click **OK**. The DHCP Address Exclusion dialog closes.

h. The **Broadcast Address** box populates automatically based on the Gateway IP address and subnet mask of the VNS.

i. Click **Close**.

5. If you selected **Use Relay**, a DHCP window displays.

   a. in the **DHCP Servers** box, type the IP address of the DHCP server to which DHCP discover and request messages will be forwarded for clients on this VNS. The SCALANCE IWLAN Controller does not handle DHCP requests from users, but instead forwards the requests to the indicated DHCP server.

Note:
The DHCP Server must be configured to match the topology settings. In particular for Routed topologies, the DHCP server must identify the SCALANCE IWLAN Controller's interface IP as the default Gateway (router) for the subnet. (Users intending to reach devices outside of the subnet will forward the packets to the default gateway (controller) for delivery upstream.)

6. To save your changes, click **Save**.

Defining a Next Hop Route and OSPF Advertisement

The next hop definition allows the administrator to define a specific host as the target for all non-VNS targeted traffic for users in a VNS. The next hop IP identifies the target device to which all VNS (user traffic) will be forwarded to. Next-hop definition supersedes any other possible definition in the routing table.

If the traffic destination from a wireless device on a VNS is outside of the VNS, it is forwarded to the next hop IP address, where this router applies policy and forwards the traffic. This feature applies to unicast traffic only. In addition, you can also modify the Open Shortest Path First (OSPF) route cost.

OSPF is an interior gateway routing protocol developed for IP networks based on the shortest path first or link-state algorithm. Using OSPF, a host that obtains a change to a routing table or detects a change in the network immediately distributes the information to all other hosts in the network so that all will have the same routing table information. The host using OSPF sends only the part that has changed, and only when a change has taken place.

To Define a Next Hop Route and OSPF Advertisement:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, expand the **Topologies** pane, then click the routed Topology you want to define a next-hop route for.

3. In the Layer 3 area, click the **Configure** button. The DHCP configuration dialog window displays.

4. In the **Next Hop Address** box, type the IP address of the next hop router on the network through which you wish all traffic on the VNS using this Topology to be directed.
5. In the **OSPF Route Cost** box, type the OSPF cost of reaching the VNS subnet.

   The OSPF cost value provides a relative cost indication to allow upstream routers to calculate whether or not to use the SCALANCE IWLAN Controller as a better fit or lowest cost path to reach devices in a particular network. The higher the cost, the less likely of the possibility that the SCALANCE IWLAN Controller will be chosen as a route for traffic, unless that SCALANCE IWLAN Controller is the only possible route for that traffic.
6. To disable **OSPF advertisement** on this VNS, select the **Disable OSPF Advertisement** checkbox.
7. Click **Close**.
8. To save your changes, click **Save**.

Exception Filtering

The exception filter provides a set of rules aimed at restricting the type of traffic that is delivered to the controller. By default, your system is shipped with a set of restrictive filtering rules that help control access through the interfaces to only those services that are absolutely necessary.

By configuring to allow management on an interface, an additional set of rules is added to the shipped filter rules that provide access to the system's management configuration framework (SSH, HTTPS, SNMP Agent). Most of this functionality is handled directly behind the scenes by the system, rolling and un-rolling canned filters as the system's topology and defined access privileges for an interface change.

Note:
An interface for which **Allow Management** is enabled, can be reached by any other interface. By default, **Allow Management** is disabled and shipped interface filters will only permit the interface to be visible directly from it's own subnet.

The visible exception filter definitions, both in physical ports and topology definitions, allow administrators to define a set of rules to be prepended to the system's dynamically updated exception filter protection rules. Rule evaluation is performed top to bottom, until an exact match is determined. Therefore, these user-defined rules are evaluated before the system's own generated rules. As such, these user-defined rules may inadvertently create security lapses in the system's protection mechanism or create a scenario that filters out packets that are required by the system.

Note:
Use exception filters only if absolutely necessary. Siemens recommends that you avoid defining general allow all or deny all rule definitions since those definitions can easily be too liberal or too restrictive to all types of traffic.

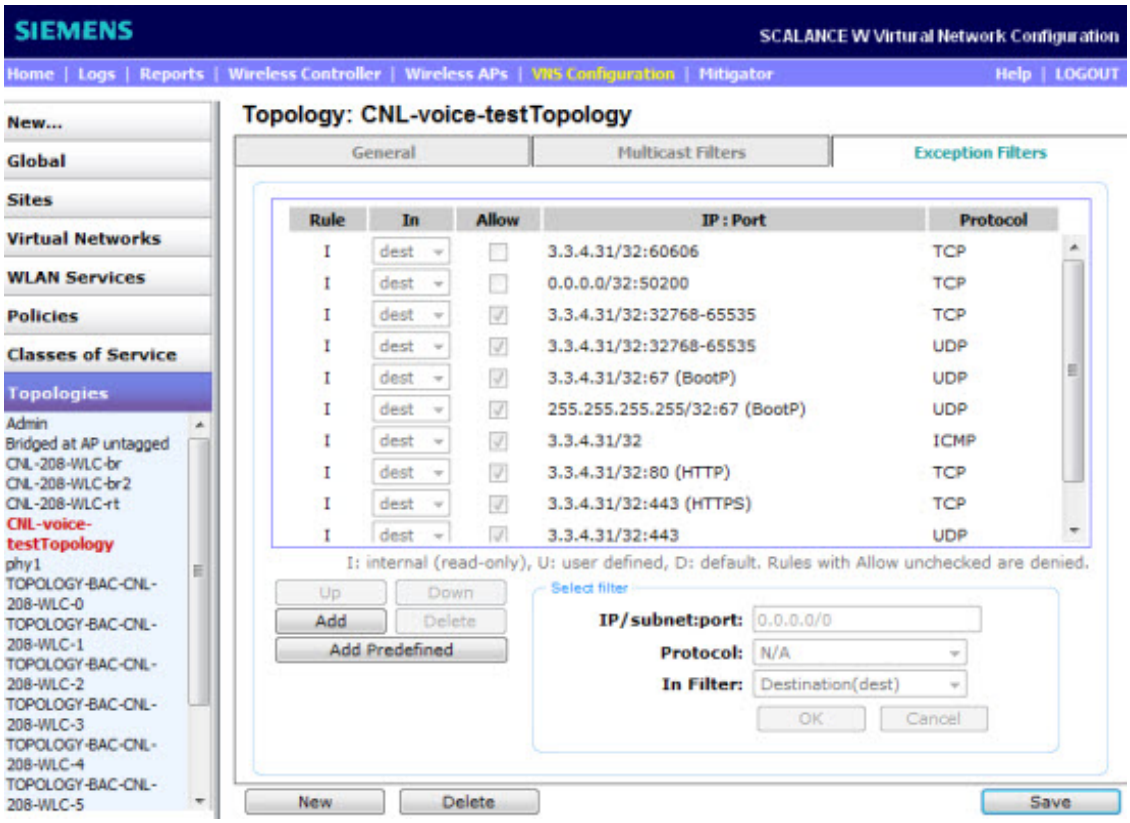
The exception rules are evaluated in the context of referring to the specific controller's interface. The destination address for the filter rule definition is typically defined as the interface's own IP address. The port number for the filter definition corresponds to the target (destination) port number for the applicable service running on the controller's management plane.

The exception filter on an topology applies only to the packets directed to the controller and can be applied to the destination portion of the packet, or to the source portion of the packet when filtering is enabled. Traffic to a specified IP address and IP port is either allowed or denied. Adding exception filtering rules allows network administrators to either tighten or relax the built-in filtering that automatically drops packets not specifically allowed by filtering rule definitions. The exception filtering rules can deny access in the event of a DoS attack, or can allow certain types of management traffic that would otherwise be denied. Typically, **Allow Management** is enabled.

To Define Exception Filters:

1. On the **Topologies** page, click the **Exception Filters** tab.

The Exceptions Filter page displays.



2. Select an existing topology from the right hand pane to edit an existing topology, or click New. to create a new topology.

   The **Topologies** configuration page displays. The Exception Filters tab is available only if Layer 3 (L3) configuration is enabled.

3. Click the Exception Filters tab to display the Exception Filters page.

Table 4-1 Exception Filters page - Fields and Buttons

Field/Button	Description
Rule	Identifies the type of filter rule. Options are: • D - Default rule • I - Internal (read-only) • T - Local interface rule • U - user-defined rule
In	Identifies the rule that applies to traffic from the network host or wireless device that is trying to get to a controller. You can change this setting using the drop-down menu. Options include: • Destination (dest) • Source (src) - available in Advanced Filtering Mode only • None • Both - available in Advanced Filtering Mode only

Table 4-1 Exception Filters page - Fields and Buttons (continued)

Field/Button	Description
Allow	Select the **Allow** checkbox to allow this rule. Otherwise the rule is denied.
IP:Port	Identifies the IP address and port to which this filter rule applies.
Protocol	In the **Protocol** drop-down list, click the applicable protocol. The default is N/A.
Up, Down	Select a filter rule and click to either move the rule up or down in the list. The filtering rules are executed in the order in which you define them here
Add	Click to add a filter rule. The fields in the Add Filter area are enabled.
Delete	Click to remove this filter rule.
Add Predefined	Select a predefined filter rule. Click Add to add the rule to the rule table, otherwise click Cancel
Save	Click to save the configuration.
Advanced Mode	Advanced filtering mode provides the ability to create bidirectional filters. **Note:** After enabling advanced filtering mode, you cannot switch back to basic filter mode unless you return the controller to its default state.
Add Filter section	
IP/subnet:port	Type the destination IP address. You can also specify an IP range, a port designation, or a port range on that IP address
Protocol	In the **Protocol** drop-down list, click the applicable protocol. The default is N/A.
In Filter	In the drop-down menu, select an option that refers to traffic from the network host that is trying to get to a wireless device. Options include: • Destination (dest) • Source (src) - available in Advanced Filtering Mode only • None • Both - available in Advanced Filtering Mode only By default, user-defined rules are enabled on ingress (**In)**, and are assumed to be **Allow** rules. To disable the rule in either direction, or to make it a Deny rule, click the new filter, then de-select the relevant checkbox.
OK	Click to add the filter rule to the filter group. The information displays in the filter rule table.
Cancel	Click **Cancel** to discard your changes.

Note:
For external Captive Portal, you need to add an external server to a non-authentication filter.

Multicast Filtering

A mechanism that supports multicast traffic can be enabled as part of a topology definition. This mechanism is provided to support the demands of VoIP and IPTV network traffic, while still providing the network access control.

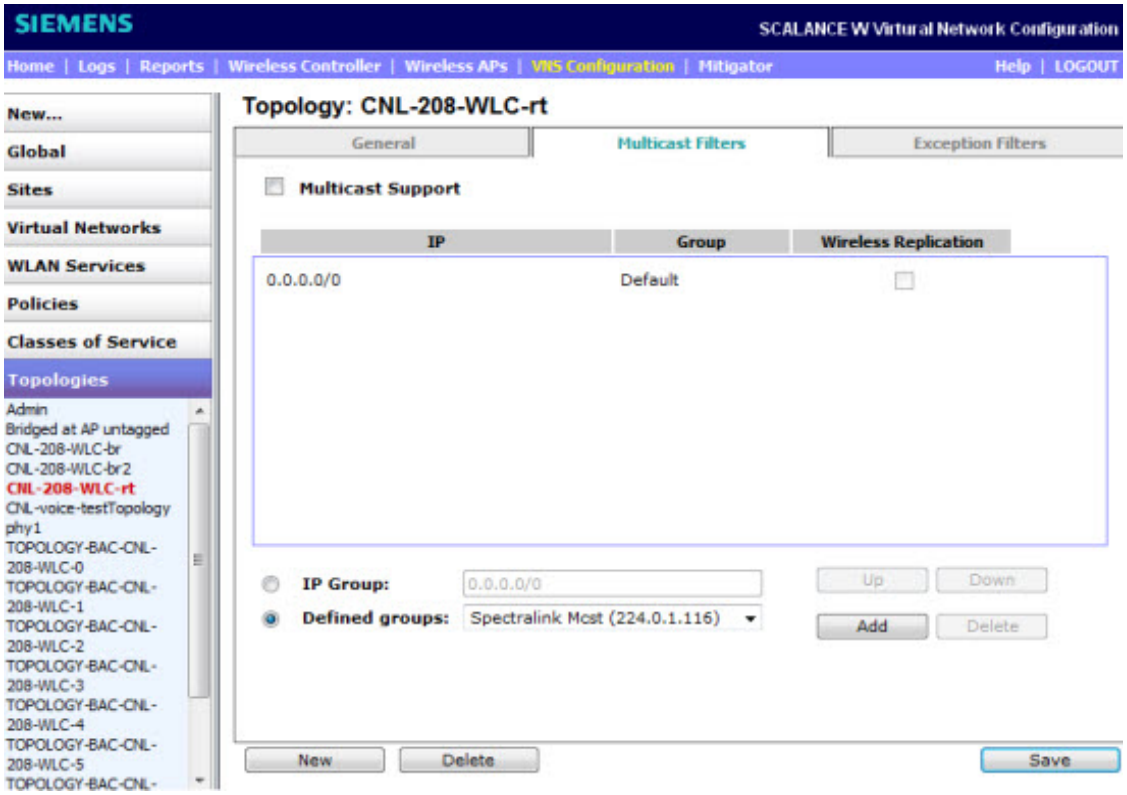
Note:
To use the mobility feature with this topology, you must select the **Enable Multicast Support** checkbox for the data port.

Define a list of multicast groups whose traffic is allowed to be forwarded to and from the VNS using this topology. The default behavior is to drop the packets. For each group defined, you can enable Multicast Replication by group.

Note:
Before enabling multicast filters and depending on the topology, you may need to define which physical interface to use for multicast relay. Define the multicast port on the **IP Addresses** tab. For more information, see “Setting Up the Data Ports” on page 2-14.

To Enable Multicast for a Topology:

1. On the **Topologies** page, click the **Multicast Filters** tab.



2. To enable the multicast function, select **Multicast Support**.
3. Define the multicast groups by selecting one of the radio buttons:
   - **IP Group** — Type the IP address range.
   - **Defined groups** — Click from the drop-down list.

4. Click **Add**. The group is added to the list above.
5. To enable the wireless multicast replication for this group, select the corresponding **Wireless Replication** checkbox.
6. To modify the priority of the multicast groups, click the group row, and then click the **Up** or **Down** buttons.

   A Deny All rule is automatically added as the last rule, IP = *.*.*.* and the **Wireless Replication** checkbox is not selected. This rule ensures that all other traffic is dropped.
7. To save your changes, click **Save**.

Note:
The multicast packet size should not exceed 1450 bytes.

5

Configuring Policies

This chapter describes policy configuration, including:

For information about...	Refer to page...
Policy Overview	5-1
Configuring VLAN and Class of Service for a Policy	5-1
Filtering Rules	5-3

Policy Overview

Policy configuration defines the binding of a topology (VLAN), ingress and egress rate profiles applied to the traffic of a station, and filter rules.

Policies don't need to be fully specified; Unspecified attributes are retained by the user or inherited from Global Policy definitions (see "Configuring the Global Default Policy" on page 7-16 for more information).

Default Global Policy definitions provide a placeholder for completion of incomplete policies for initial default assignment. If a policy is defined as Default for a particular VNS, the policy inherits incomplete attributes from Default Global Policy definitions

Configuring VLAN and Class of Service for a Policy

From the VLAN & Class of Service tab you can assign a previously configured topology to a policy. You can also launch the Topology Configuration page to edit an existing topology or create a new one. For information about how to configure a topology, refer to Chapter 4, **Configuring Topologies**.

In general, Class of Service (CoS) refers to a set of attributes that define the importance of a frame while it is forwarded through the network relative to other packets, and to the maximum throughput per time unit that a station or port assigned to the policy is permitted. The CoS defines actions to be taken when rate limits are exceeded.

To configure VLAN and Class of Service for a policy:

1. From the top menu, click **VNS Configuration**.

   The **Virtual Network Configuration** screen displays.

2. In the left pane expand the **Policies** pane and click the policy you want to edit, or click the **New** button to create a new policy.

   The **Policy** configuration page displays. By default, the **VLAN & Class of Service** tab displays (Figure 5-1). Table 5-1 describes the fields and buttons on the VLAN & Class of Service tab.

Figure 5-1 VLAN & Class of Service Tab

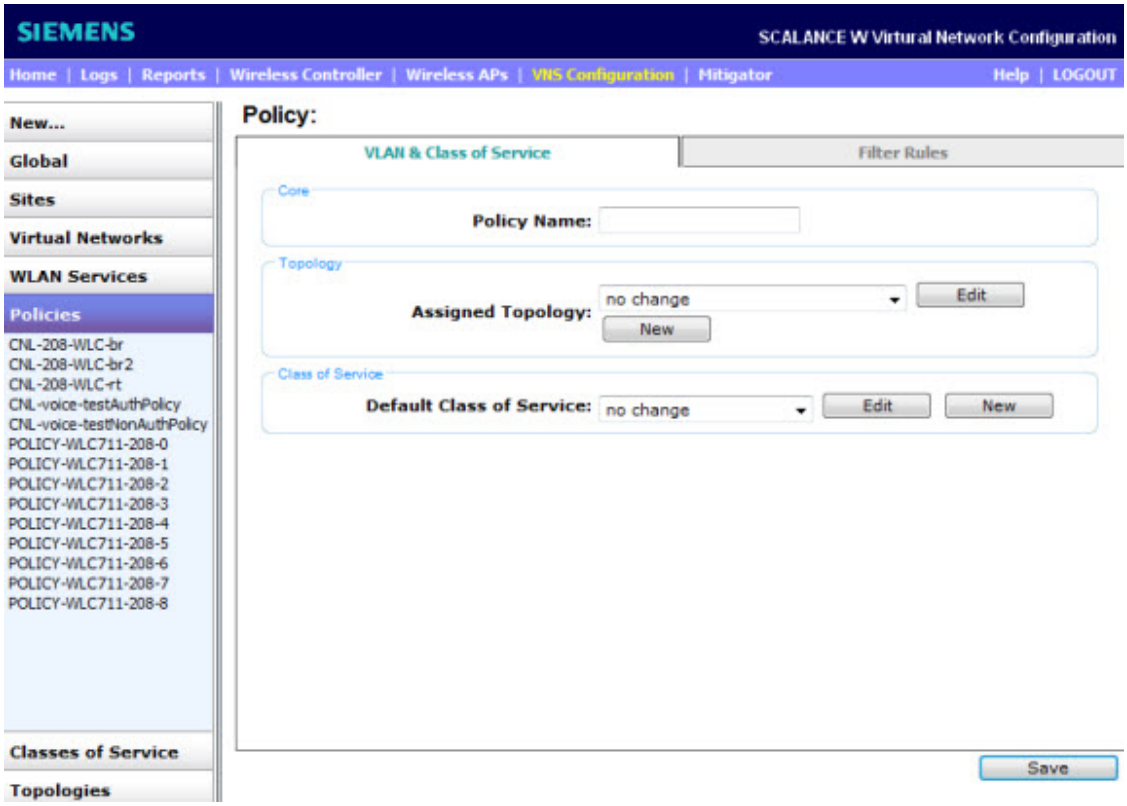


Table 5-1 VLAN & Class of Service Tab - Fields and Buttons

Field/Button	Description
Core	
Policy Name	Enter a name to assign to this policy.
Topology	
Assigned Topology	Select an existing topology from the **Assigned Topology** drop-down list, or click the **New** button to create a new topology. To edit an existing topology, select the topology and then click the **Edit** button. The Edit Topology page displays. For information about how to configure a topology, go to “Configuring Topologies” on page 4-1.
Class of Service	
Default Class of Service	Select an existing class of service from the **Default Class of Service** drop-down list, or click the **New** button to create a new topology. To edit an existing class of service, select the class of service and then click the **Edit** button. The Edit Class of Service page displays. For information about how to configure a Class of Service, go to Chapter 8, “Configuring Classes of Service.”

Table 5-1 VLAN & Class of Service Tab - Fields and Buttons (continued)

Field/Button	Description
Status	
Synchronize	Click to enable synchronize configuration.

For more information about rate control profiles, go to "Working with Bandwidth Control Profiles" on page 7-15 for more information.

Filtering Rules

Optionally, you can define filter rules for the policy. The policy name should match filter ID values set up on the RADIUS servers.

If you do not define filter rules, then the system uses the default filter for authenticated users. However, if you require user-specific filter definitions, then the filter ID configuration identified the specific policy that should be applied to the user.

You can configure a filter definition to be static on the SCALANCE IWLAN Controller itself, or to be dynamically provisioned if RADIUS authentication is used. The standard RADIUS attribute can be used to identify a specific filter definition to apply to incoming/outgoing user traffic upon successful authentication of the user during authentication. You can configure up to three types of filters, depending on your network assignment type.

Table 5-2 Filter Types

Filter Type	AAA Network Assignment	SSID Assignment
Exception filter	Yes	Yes
Non-authenticated filter	-	Yes
Default filter	Yes	Yes

For information about configuring exception filters, refer to go to "Exception Filtering" on page 4-11

Filtering Rules for a Non-authenticated Filter

Defining non-authenticated filters allows administrators to identify destinations to which a mobile user is allowed to access without incurring an authentication redirection. Typically, the recommended default rule is to deny all. Administrators should define a rule set that will permit users to access essential services:

- DNS (IP of DNS server)
- Default Gateway (VNS Interface IP)

Any HTTP streams requested by the client for denied targets will be redirected to the specified location.

The non-authenticated filter should allow access to the Captive Portal page IP address, as well as to any URLs for the header and footer of the Captive Portal page. This filter should also allow network access to the IP address of the DNS server and to the network address—the gateway of the Topology. The gateway is used as the IP for an internal Captive Portal page.

Redirection and Captive Portal credentials apply to HTTP traffic only. A wireless device user attempting to reach Websites other than those specifically allowed in the non-authenticated filter will be redirected to the allowed destinations. Most HTTP traffic outside of that defined in the non-authenticated filter will be redirected.

Note:
Although non-authenticated filters definitions are used to assist in the redirection of HTTP traffic for restricted or denied destinations, the non-authenticated filter is not restricted to HTTP operations. The filter definition is general. Any traffic other than HTTP that the filter does not explicitly allow will be discarded by the controller.

The non-authenticated filter is applied by the SCALANCE IWLAN Controller to sessions until they successfully complete authentication. The authentication procedure results in an adjustment to the user's applicable filters for access policy.

Typically, default filter ID access is less restrictive than a non-authenticated profile. It is the administrator's responsibility to define the correct set of access privileges.

Note:
Administrators must ensure that the non-authenticated filter allows access to the corresponding authentication server:

- **Internal Captive Portal** — IP address of the VNS interface

Non-authenticated Filter Examples

A basic non-authenticated filter for internal Captive Portal should have three rules, in the following order:

Table 5-3 Non-authenticated Filter Example A

In	Out	Allow	IP / Port	Description
x	x	x	IP address of default gateway (VNS Interface IP)	Allow all incoming wireless devices access to the default gateway of the VNS.
x	x	x	IP address of the DNS Server	Allow all incoming wireless devices access to the DNS server of the VNS.
x	x		*.*.*.*	Deny everything else.

If you place URLs in the header and footer of the Captive Portal page, you must explicitly allow access to any URLs mentioned in the authentication server's page, such as:

- **Internal Captive Portal** — URLs referenced in a header or footer

Here is another example of a non-authenticated filter that adds two more filtering rules. The two additional rules do the following:

- Deny access to a specific IP address.
- Allow only HTTP traffic.

Table 5-4 Non-authenticated Filter Example B

In	Out	Allow	IP / Port	Description
x	x	x	IP address of the default gateway	Allow all incoming wireless devices access to the default gateway of the VNS.

Table 5-4 Non-authenticated Filter Example B (continued)

In	Out	Allow	IP / Port	Description
x	x	x	IP address of the DNS Server	Allow all incoming wireless devices access to the DNS server of the VNS.
x	x		[a specific IP address, or address plus range]	Deny all traffic to a specific IP address, or to a specific IP address range (such as:0/24).
x	x	x	*.*.*.*:80	Allow all port 80 (HTTP) traffic.
x	x		*.*.*.*	Deny everything else.

Once a wireless device user has logged in on the Captive Portal page, and has been authenticated by the RADIUS server, then the following filters will apply:

- **Policy filters** — If a filter ID associated with this user is returned by the authentication server, then the Policy with the same name as the filter ID will be applied.
- **Default filter** — If no matching filter ID is returned from the authentication server.

Authenticated Filter Examples

Below are two examples of possible filtering rules for authenticated users. The first example disallows some specific access before allowing everything else.

Table 5-5 Filtering Rules Example A

In	Out	Allow	IP / Port	Description
x	x		*.*.*.*:22-23	SSH and telnet sessions
x	x		[specific IP address, range]	Deny all traffic to a specific IP address or address range
x	x	x	*.*.*.*.	Allow everything else

The second example does the opposite of the first example. It allows some specific access and denies everything else.

Table 5-6 Filtering Rules Example B

In	Out	Allow	IP / Port	Description
x	x	x	[specific IP address, range]	Allow traffic to a specific IP address or address range.
x	x		*.*.*.*.	Deny everything else.

ICMP Type Enforcement

ICMP filter rules can now be constrained to ICMP type/range. You can define the ICMP type/range in the Port field using the TCP/UDP port definition nomenclature. That is, define the rule as a normal IP/subnet:port signature (10.0.0.0/24:8), where the ICMP type is entered in the Port field.

This feature allows for tighter granularity over enforcement of ICMP restrictions. You can allow redirects and DF/MTU indications, and deny ICMP Echo (pings) for users.

Filtering Rules for a Default Filter

After authentication of the wireless device user, the default filter will apply only after:

- No filter ID attribute value is returned by the authentication server for this user.
- No Policy match is found on the SCALANCE IWLAN Controller for the filter ID value.

The final rule in the default filter should be a catch-all rule for any traffic that did not match a filter. A final Allow All rule in a default filter will ensure that a packet is not dropped entirely if no other match can be found. VNS Policy is also applicable for Captive Portal and MAC-based authorization.

Default Filter Examples

The following are examples of filtering rules for a default filter:

Table 5-7 Default Filter Example A

In	Out	Allow	IP / Port	Description
x	x		Intranet IP, range	Deny all access to an IP range
x	x		Port 80 (HTTP)	Deny all access to Web browsing
x	x		Intranet IP	Deny all access to a specific IP
x	x	x	*.*.*.*.	Allow everything else

Table 5-8 Default Filter Example B

In	Out	Allow	IP / Port	Description
	x		Port 80 (HTTP) on host IP	Deny all incoming wireless devices access to Web browsing the host
x			Intranet IP 10.3.0.20, ports 10-30	Deny all traffic from the network to the wireless devices on the port range, such as telnet (port 23) or FTP (port 21)
	x	x	Intranet IP 10.3.0.20	Allow all other traffic from the wireless devices to the Intranet network
x		x	Intranet IP 10.3.0.20	Allow all other traffic from Intranet network to wireless devices
x	x		*.*.*.*.	Deny everything else

Filtering Rules Between Two Wireless Devices

Traffic from two wireless devices that are on the same VNS and are connected to the same Wireless AP will pass through the SCALANCE IWLAN Controller and therefore be subject to filtering policy. You can set up filtering rules that allow each wireless device access to the default gateway, but also prevent each device from communicating with each other.

Add the following two rules to a filter ID filter, before allowing everything else:

Table 5-9 Rules Between Two Wireless Devices

In	Out	Allow	IP / Port	Description
x	x	x	[Intranet IP]	Allow access to the Gateway IP address of the VNS only

Table 5-9 Rules Between Two Wireless Devices (continued)

In	Out	Allow	IP / Port	Description
x	x		[Intranet IP, range]	Deny all access to the VNS subnet range (such as 0/24)
x	x	x	*.*.*.*.	Allow everything else

Note:
You can also prevent the two wireless devices from communicating with each other by setting **Block Mu to MU traffic**. See "Configuring a Basic WLAN Service" on page 6-2.

Defining Filter Rules for Wireless APs

You can also apply filter rules on the Wireless AP. Applying filter rules at the Wireless AP helps restrict unwanted traffic at the edge of your network. The Wireless APs can support up to a maximum of 32 filters rules per group. Filtering at the Wireless AP can be configured with the following Topology types:

- **Bridge Traffic Locally at the AP** — If filtering at the Wireless AP is enabled on a Bridge Traffic Locally at the AP topology, the filtering is applied to traffic in both the uplink and downlink direction — the uplink direction is from the wireless device to the network, and the downlink direction is from the network to the wireless device.
- **Routed** and **Bridge Traffic Locally at the WLC** — If filtering at the Wireless AP is enabled on a Routed or Bridge Traffic Locally at the WLC topology, the filtering is applied only to traffic in the UL direction. The filters applied in the UL direction at the Wireless AP can be the same as or different from filters applied at the SCALANCE IWLAN Controller.

Wireless AP Filtering

When filtering at the Wireless AP is enabled, Wireless APs obtain client filter information from the SCALANCE IWLAN Controller. In addition, direct inter-Wireless AP communication allows Wireless APs to exchange client filter information as clients roam from one Wireless AP to another. This allows the system to achieve a very fast roaming time. To take advantage of inter-Wireless AP communication, you should configure the network such that Wireless APs in the mobility domain can communicate with each other through the Wireless AP's Ethernet interface. Also, multicast traffic with an IP address of 224.0.1.178 should be allowed between Wireless APs.

Configuring Filter Rules

To Configure Filter Rules for the Controller:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, expand the **Policies** pane and click the Policy you want to edit, or click the New button to create a new policy.

   The **Policy** configuration page is displayed.
3. Click the **Filter Rules** tab.

   The **WLC Filters** tab displays. See Figure 5-2 on page 5-8.
4. Configure filter rules for the controller. See Table 5-9 on page 5-6.

To configure filter rules for the wireless AP:

1. Select the **AP Filtering** checkbox to enable the filter rules defined on the WLC Filters tab to be applied by Wireless APs. The Custom AP Filters checkbox becomes available.
2. Select the **Custom AP Filters** checkbox to configure additional filters for the APs. An **AP Filters** tab is added to the window.
3. Click the **AP Filters** tab. The AP Filters tab displays. See Figure 5-3 on page 5-9.
4. Configure filter rules for the APs.

Figure 5-2 Filter Rules Page - WLC Filters Tab

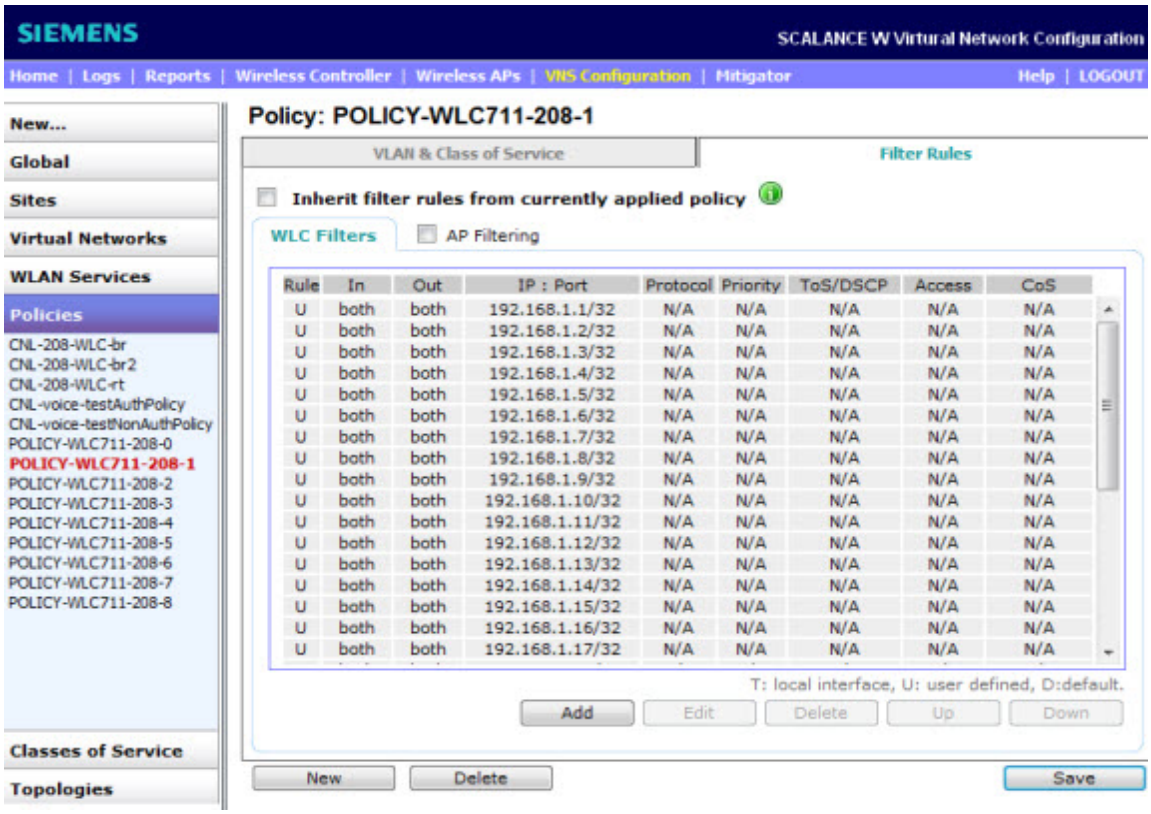

SIEMENS
SCALANCE W Virtural Network Configuration
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
New...
Global
Sites
Virtual Networks
WLAN Services
Policies
CNL-208-WLC-br
CNL-208-WLC-br2
CNL-208-WLC-rt
CNL-voice-testAuthPolicy
CNL-voice-testNonAuthPolicy
POLICY-WLC711-208-0
POLICY-WLC711-208-1
POLICY-WLC711-208-2
POLICY-WLC711-208-3
POLICY-WLC711-208-4
POLICY-WLC711-208-5
POLICY-WLC711-208-6
POLICY-WLC711-208-7
POLICY-WLC711-208-8
Classes of Service
Topologies
Policy: POLICY-WLC711-208-1
VLAN & Class of Service
Filter Rules
Inherit filter rules from currently applied policy
WLC Filters
AP Filtering
Rule In Out IP : Port Protocol Priority ToS/DSCP Access CoS
U both both 192.168.1.1/32 N/A N/A N/A N/A N/A
U both both 192.168.1.2/32 N/A N/A N/A N/A N/A
U both both 192.168.1.3/32 N/A N/A N/A N/A N/A
U both both 192.168.1.4/32 N/A N/A N/A N/A N/A
U both both 192.168.1.5/32 N/A N/A N/A N/A N/A
U both both 192.168.1.6/32 N/A N/A N/A N/A N/A
U both both 192.168.1.7/32 N/A N/A N/A N/A N/A
U both both 192.168.1.8/32 N/A N/A N/A N/A N/A
U both both 192.168.1.9/32 N/A N/A N/A N/A N/A
U both both 192.168.1.10/32 N/A N/A N/A N/A N/A
U both both 192.168.1.11/32 N/A N/A N/A N/A N/A
U both both 192.168.1.12/32 N/A N/A N/A N/A N/A
U both both 192.168.1.13/32 N/A N/A N/A N/A N/A
U both both 192.168.1.14/32 N/A N/A N/A N/A N/A
U both both 192.168.1.15/32 N/A N/A N/A N/A N/A
U both both 192.168.1.16/32 N/A N/A N/A N/A N/A
U both both 192.168.1.17/32 N/A N/A N/A N/A N/A
T: local interface, U: user defined, D:default.
Add
Edit
Delete
Up
Down
New
Delete
Save

Figure 5-3 Filter Rules Page - AP Filters Tab

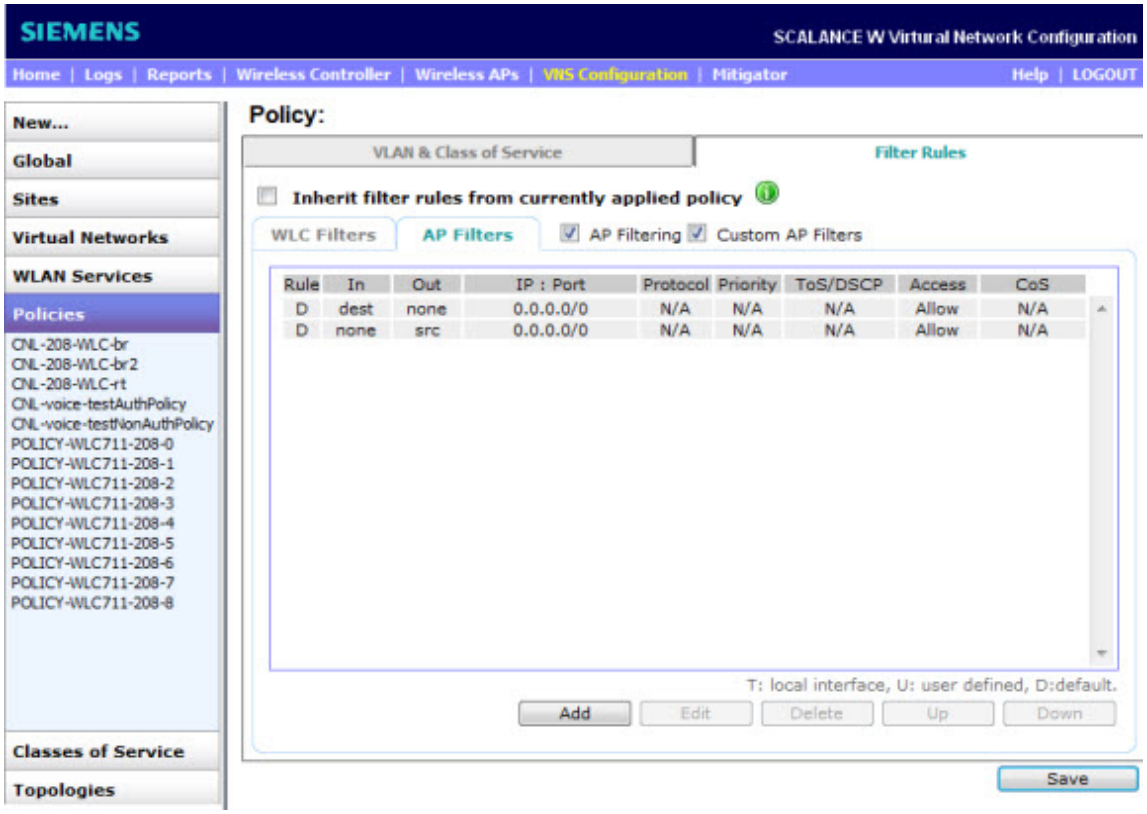


Table 5-10 WLC and AP Filters Tabs - Fields and Buttons

Field/Button	Description
Inherit filter rules from currently applied policy	Select if you do not want to apply new filter settings. If you do not apply new filter settings, the wireless client uses filter settings from a previously applied policy. If filters were never defined, then the system enforces the filters from the Global Default Policy. If you choose to apply new filter settings by not selecting this option, the new filter settings will overwrite any pre-existing filter settings.
AP Filtering	Select to apply the configured filters to the Wireless AP.
Custom AP Filters	Select to create a new filter definition to apply to the Wireless AP.
Rule	Identifies the type of filter rule. Options are: • D - Default rule • I - Internal (read-only) • T - Local interface rule • U - User-defined rule

Table 5-10 WLC and AP Filters Tabs - Fields and Buttons (continued)

Field/Button	Description
In	Identifies the rule that applies to traffic from the wireless device that is trying to get on the network. You can change this setting using the drop-down menu. Options include: • Destination (dest) - available in Advanced Filtering Mode only • Source (src) • None • Both - available in Advanced Filtering Mode only The policy for inbound traffic may be impacted by the selection (mode) for Egress Filtering. For more information, see Configuring Egress Filtering Mode.
Out	Identifies the rule that applies to traffic from the network host that is trying to get to a wireless device. You can change this setting using the drop-down menu. Options include: • Destination (dest) • Source (src) - available in Advanced Filtering Mode only • None • Both - available in Advanced Filtering Mode only The policy for outbound traffic may be impacted by the selection (mode) for Egress Filtering. For more information, see Configuring Egress Filtering Mode.
Allow	Select the **Allow** checkbox to allow this rule. Otherwise the rule is denied.
IP:Port	Identifies the IP address and port to which this filter rule applies.
Protocol	In the Protocol drop-down list, click the applicable protocol. The default is N/A.
Up, Down	Select a filter rule and click to either move the rule up or down in the list. The filtering rules are executed in the order in which you define them.
Add	Click to add a filter rule. The fields in the Add Filter area are enabled.
Delete	Click to remove this filter rule.
Save	Click to save the configuration.
Add Filter section	
IP/subnet	Select one of the following: • **User Defined**, then type the destination IP address and mask. Use this option to explicitly define the IP/subnet aspect of the filter rule. • **IP** - select to map the rule to the associated Topology IP address. • **Subnet** - select to map the rule to the associated Topology segment definition (IP address/mask).

Table 5-10 WLC and AP Filters Tabs - Fields and Buttons (continued)

Field/Button	Description
Port	From the **Port** drop-down list, select one of the following: **User Defined**, then type the port number. Use this option to explicitly specify the port number. A specific port type. The appropriate port number or numbers are added to the Port text field.
Protocol	In the **Protocol** drop-down list, click the applicable protocol. The default is N/A. “ICMP Type Enforcement” on page 5-5 provides more information about selecting the ICMP protocol.
In Filter	In the drop-down menu, select an option that refers to traffic from the network host that is trying to get to a wireless device. Options include: • Destination (dest) • Source (src) - available in Advanced Filtering Mode only • None • Both - available in Advanced Filtering Mode only The policy for inbound traffic filters may be impacted by the selection (mode) for Egress Filtering. For more information, see Configuring Egress Filtering Mode.
Out Filter	In the drop-down menu, select an option that refers to traffic from the wireless device that is trying to get on the network. Options include: • Destination (dest) • Source (src) - available in Advanced Filtering Mode only • None • Both - available in Advanced Filtering Mode only The policy for outbound traffic filters may be impacted by the selection (mode) for Egree Filtering. For more information, see Configuring Egress Filtering Mode.
OK	Click to add the filter rule to the filter group. The information is displayed in the filter rule table.
Cancel	Click **Cancel** to discard your changes.

Note: For Captive Portal assignment, define a rule to allow access to the default gateway for this controller. You should also configure a rule denying HTTP on the controller.

6

Configuring WLAN Services

This chapter describes WLAN service configuration, including:

For information about...	Refer to page...
WLAN Services Overview	6-1
Third-party AP WLAN Service Type	6-2
Configuring a Basic WLAN Service	6-2
Configuring Privacy	6-8
Configuring Accounting and Authentication	6-14
Configuring the QoS Policy	6-35

WLAN Services Overview

A WLAN Service represents all the RF, authentication and QoS attributes of a wireless access service. The WLAN Service can be one of the following types:

- Standard — A conventional service. Only APs running SCALANCE IWLAN software can be part of this WLAN Service. This type of service may be used as a Bridged @ Controller, Bridged @ AP, or Routed VNS. This type of service provides access for mobile stations. Therefore, policies can be assigned to this type of WLAN service to create a VNS.
- Third Party AP — A wireless service offered by third party APs. This type of service provides access for mobile stations. Therefore, policies can be assigned to this type of WLAN service to create a VNS.
- Dynamic Mesh and WDS (Static Mesh)— A group of APs organized into a hierarchy for the purposes of providing a Wireless Distribution Service. This type of service is in essence a wireless trunking service rather than a service that provides access for stations. As such, this service cannot have policies attached to it.
- Remote — A service that resides on the edge (foreign) SCALANCE IWLAN Controller. Pairing a remote service with a remoteable service on the designated home SCALANCE IWLAN Controller allows you to provision centralized WLAN Services in the mobility domain. This is known as centralized mobility.

  The remote service should have the same SSID name and privacy as the home remoteable service. Any WLAN Service/VNS can be a remoteable service, though deployment preference is given to tunneled topologies (Bridged@Controller and Routed).

  To reduce the amount of information distributed across the mobility domain, you will explicitly select which WLAN Services are available from one controller to any other controller in the mobility domain.

The WLAN Service remoteable property is synchronized with the availability peer, making the WLAN service published by both the home and foreign controllers.

The following types of authentication are supported for remote WLAN services:

- None
- Internal Captive Portal
- Guest Portal
- Guest Splash
- AAA/802.1x

Third-party AP WLAN Service Type

For more information, see Chapter 14, **Working with Third-party APs**.

A third-party AP WLAN Service allows for the specification of a segregated subnet by which non-Siemens Wireless APs are used to provide RF services to users while still utilizing the SCALANCE IWLAN Controller for user authentication and user policy enforcement.

Note:
Third-party AP devices are not fully integrated with the system and therefore must be managed individually to provide the correct user access characteristics.

The definition of third-party AP identification parameters allows the system to be able to differentiate the third-party AP device (and corresponding traffic) from user devices on that segment. Devices identified as third-party APs are considered pre-authenticated, and are not required to complete the corresponding authentication verification stages defined for users in that segment (typically Captive Portal enforcement).

In addition, third-party APs have a specific set of filters (third-party) applied to them by default, which allows the administrator to provide different traffic access restrictions to the third-party AP devices for the users that use those resources. The third-party filters could be used to allow access to third-party APs management operations (for example, HTTP, SNMP).

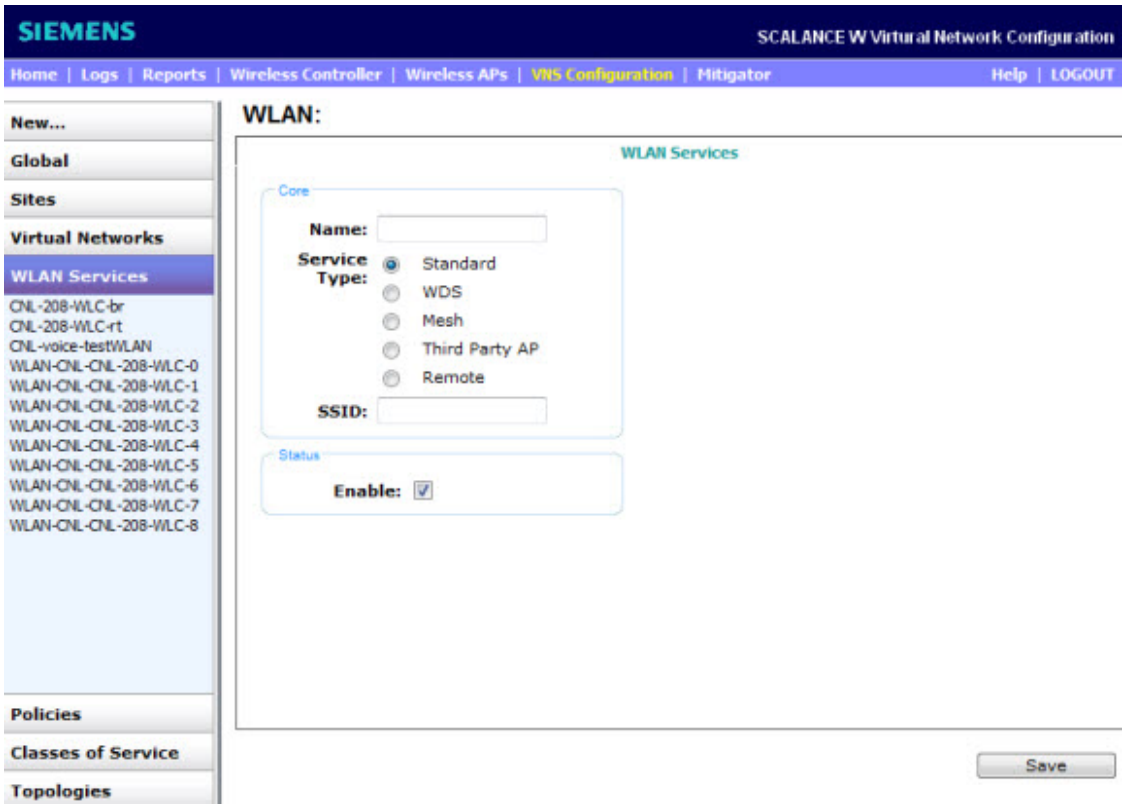
Configuring a Basic WLAN Service

To Configure a WLAN Service:

1. From the top menu, click **VNS Configuration**. Then, in the left pane, select **WLAN Services**.

   The WLAN Services window displays.

2. To create a new service, click the **New** button. The New WLAN Services configuration window displays.



a. Enter a name for the WLAN service.

b. Select the service type.

c. Change the SSID (optional).

d. Click Save.

The WLAN Services Configuration page displays.

3. To edit an existing service, select the desired service from the left pane. The WLAN Services Configuration page displays. Table 6-1 describes the WLAN services configuration page fields and buttons.

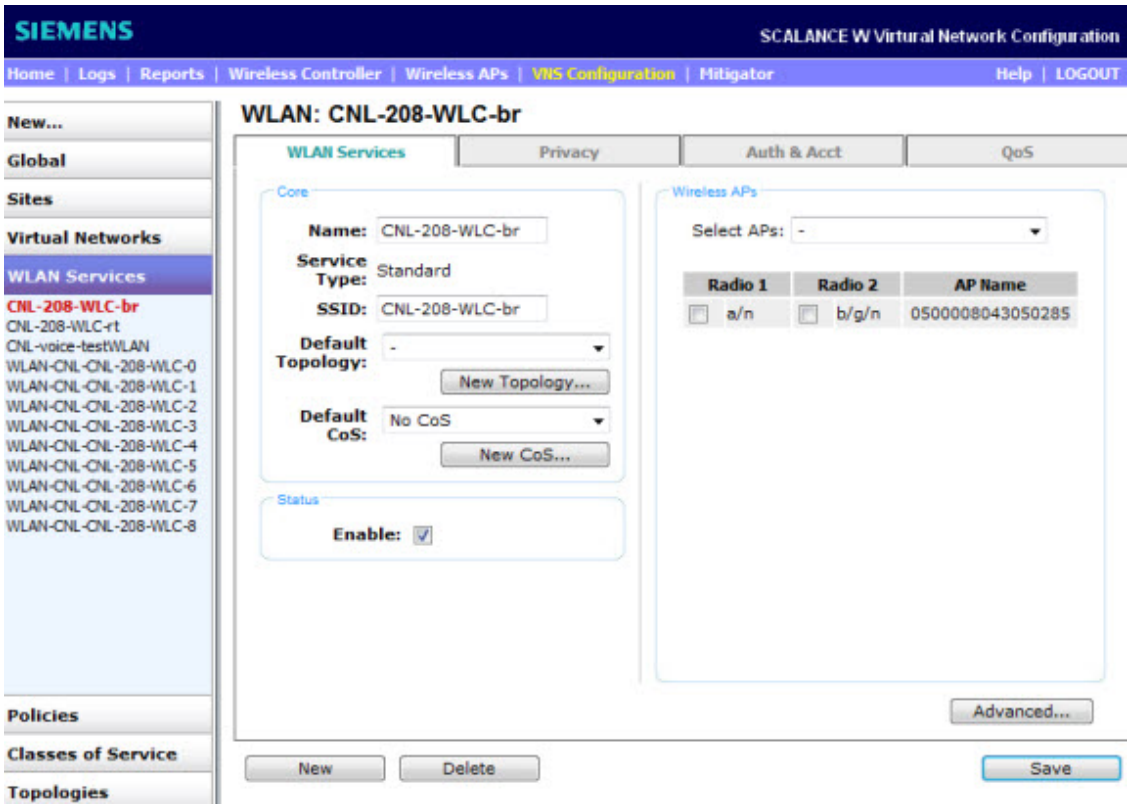


Table 6-1 WLAN Services Configuration Page

Field/Button	Description
Core	
Name	Enter a name for this WLAN service
Service Type	Select the type of service to apply to this WLAN service. Options include: • Standard • WDS • Mesh • Third Party AP • Remote If you selected **Remote** as the **Service Type**, select the **Privacy** type. If you set **Service Type** as either **Standard** or **Remote**, select **Synchronize**, in the Status area, if desired. Enabling this feature allows availability pairs to be synchronized automatically
SSID	The software automatically populates this field with the WLAN service name that you supply. Optionally, you can change this. If you are creating a remote WLAN service, select the SSID of the remoteable service that this remote service will be paired with.

Table 6-1 WLAN Services Configuration Page (continued)

Field/Button	Description
Default Topology	From the drop-down list, select a preconfigured topology or click New Topology to create a new one. Refer to "Configuring a Basic Data Port Topology" on page 4-4 for information about how to create a new topology. A WLAN service uses the topology of the policy assigned to the VNS, if such a topology is defined. If the policy doesn't define a topology, you can assign an existing topology as the default topology to the WLAN service. If you choose not to assign a default topology to the WLAN service, the WLAN service will use the topology of the global default policy (by default, Bridged at AP Untagged). **Note:** You cannot assign a default topology to a WDS, 3rd party, or remote WLAN service.
Default CoS	From the drop-down list, select a preconfigured CoS or click New CoS to create a new one. Refer to "Configuring Classes of Service" on page 8-1 for information on how to create a new CoS. A WLAN service uses the CoS of the policy assigned to the VNS, if such a CoS is defined. If the policy doesn't define a CoS, you can assign an existing CoS as the default CoS to the WLAN service. If you choose not to assign a default CoS to the WLAN service, the WLAN service will use the CoS of the global default policy (by default, Bridged at AP Untagged). **Note:** You cannot assign a default CoS to a WDS, 3rd party, or remote WLAN service.
Status	
Enable	Select the checkbox to enable this WLAN service. Otherwise, deselect this checkbox. The WLAN service is enabled by default, unless the number of supported enabled WLAN Services has been reached.

Table 6-1 WLAN Services Configuration Page (continued)

Field/Button	Description
Wireless APs	
Select APs	Select APs and their radios by grouping. Options include: • **all radios** — Click to assign all of the APs' radios. • **radio 1** — Click to assign only the APs' Radio 1. • **radio 2**— Click to assign only the APs' Radio 2. • **local APs - all radios** — Click to assign only the local APs. • **local APs - radio 1** — Click to assign only the local APs' Radio 1. • **local APs - radio 2** — Click to assign only the local APs' Radio 2. • **foreign APs - all radios** — Click to assign only the foreign APs. • **foreign APs - radio 1** — Click to assign only the foreign APs' Radio 1. • **foreign APs - radio 2** — Click to assign only the foreign APs' Radio 2. • **clear all selections** — Click to clear all of the AP radio assignments. • **original selections** — Click to return to the AP radio selections prior to the most recent save. **Note:** If two SCALANCE IWLAN Controllers have been paired for availability (for more information, see "Availability" on page 12-1), each SCALANCE IWLAN Controller's registered Wireless APs are displayed as foreign in the list of available Wireless APs on the other SCALANCE IWLAN Controller
Radio 1	Assign the Wireless APs' Radios to the service by selecting the individual radios' checkboxes. Alternatively, you can use the **Select APs** list.
Radio 2	Assign the Wireless APs' Radios to the service by selecting the individual radios' checkboxes. Alternatively, you can use the **Select APs** list.
Advanced	Click to access the WLAN service advanced configuration options. The Advanced configuration page options are described in Table 6-2 on page 6-7.
New	Click to create a new WLAN service.
Delete	Click to delete this WLAN service.
Save	Click to save the changes to this WLAN service. If you are creating a new service, the WLAN Services configuration window is displayed, allowing you to assign Wireless APs to the service.

Table 6-2 Advanced WLAN Service Configuration Page

Field/Button	Description
Timeout	
Idle (pre)	Specify the amount of time in minutes that a Mobile user can have a session on the controller in pre-authenticated state during which no active traffic is passed. The session will be terminated if no active traffic is passed within this time. The default value is 5 minutes.
Idle (post)	Specify the amount of time in minutes that a Mobile user can have a session on the controller in authenticated state during which no active traffic is passed. The session will be terminated if no active traffic is passed within this time. The default value is 30 minutes.
Session	Specify the maximum number of minutes of service to be provided to the user before the termination of the session.
RF - select one or more of the following options:	
Suppress SSID	Select to prevent this SSID from appearing in the beacon message sent by the Wireless AP. The wireless device user seeking network access will not see this SSID as an available choice, and will need to specify it.
Enable 11h support	Select to enable 11h support. By default this option is disabled. Siemens recommends that you enable this option.
Apply power reduction to 11h clients	Select to enable the Wireless AP to use reduced power (as does the 11h client). By default this option is disabled. Siemens recommends that you enable this option. This option is available only if you enable 11h support.
Process client IE requests	Select to enable the Wireless AP to accept IE requests sent by clients via Probe Request frames and responds by including the requested IE's in the corresponding Probe Response frames. By default this option is disabled. Siemens recommends that you enable this option.
Energy Save Mode	Select to reduce the number of beacons the AP transmits on a BSSID when no client is associated with the BSSID. This reduces both the power consumption of the AP and the interference created by the AP when no client is associated.
Egress Filtering Mode	
Enforce explicitly defined "Out" rules	Traffic is filtered as configured. For more information, see "Configuring Egress Filtering Mode" on page 7-17.
Apply "In" rules to "out" direction traffic	The role of the source and destination addresses are reversed. For more information, see "Configuring Egress Filtering Mode" on page 7-17.
Client Behavior	
Block MU to MU traffic	Select the **Block Mu to MU traffic** checkbox if you want to prevent two devices associated with this SSID and registered as users of the controller, to be able to talk to each other. The blocking is enforced at the L2 (device) classification level.

Table 6-2 Advanced WLAN Service Configuration Page (continued)

Field/Button	Description
802.1D	
8021D Base Port: xxx	The **802.1D Base Port** number is read-only.
Remote Service	
Remoteable	Select the checkbox if you want to pair this service with a remote service.
Inter-WLAN Service Roaming	
Permit Inter-WLAN Service Roaming	Select to enable a client on a controller to maintain the session, including the IP address and policy assignment, while roaming between VNSs having the same SSID and privacy settings. If not selected, when the client roams among VNSs, the existing session terminates and a new session starts with the client having to associated and authenticate again. The list of VNSs that share the same SSID and privacy settings displays below.
Unauthenticated Behavior	
Discard Unauthenticated Traffic	Select the checkbox to drop all traffic flowing to and from an unauthenticated station.
Default Non-Authenticated Policy	Select the checkbox to apply the default non-authenticated policy to all traffic flowing to and from an unauthenticated station.
Close	Click to close this page.

Note:
If two SCALANCE IWLAN Controllers have been paired for availability (for more information, see “Availability” on page 12-1), each SCALANCE IWLAN Controller's registered Wireless APs are displayed as foreign in the list of available Wireless APs on the other SCALANCE IWLAN Controller.

After you have assigned a Wireless AP Radio to eight WLAN Services, it will not appear in the list for another WLAN Service setup. Each Radio can support up to eight SSIDs (16 per AP). Each AP can be assigned to any of the VNSs defined within the system. The SCALANCE IWLAN Controller can support the following active VNS:

- WLC711 — Up to 8 VNSs

Note:
You can assign the Radios of SCALANCE APs to any VNS.

Configuring Privacy

Privacy is a mechanism that protects data over wireless and wired networks, usually by encryption techniques. The SCALANCE IWLAN Controller provides several privacy mechanism to protect data over the WLAN.

There are five privacy options:

- **None**

- **Static Wired Equivalent Privacy (WEP)** — Keys for a selected VNS, so that it matches the WEP mechanism used on the rest of the network. Each AP can participate in up to 50 VNSs. For each VNS, only one WEP key can be specified. It is treated as the first key in a list of WEP keys.
- **Dynamic Keys** — The dynamic key WEP mechanism changes the key for each user and each session.
- **Wi-fi Protected Access (WPA)**
  - version 1 with encryption by temporal key integrity protocol (TKIP)
  - version 2 with encryption by advanced encryption standard with counter-mode/CBC-MAC protocol (AES-CCMP)
- **Wi-Fi Protected Access (WPA) Pre-Shared key (PSK)** — Privacy in PSK mode, using a Pre-Shared Key (PSK), or shared secret for authentication. WPA-PSK is a security solution that adds authentication to enhanced WEP encryption and key management. WPA-PSK mode does not require an authentication server. It is suitable for home or small office.

Note:
Regardless of the Wireless AP model or WLAN Service type, a maximum of 112 simultaneous clients, per radio, are supported by all of the data protection encryption techniques.

About Wi-Fi Protected Access (WPA V1 and WPA V2)

Note:
To achieve the strongest encryption protection for your VNS, Siemens recommends that you use WPA v.1 or WPA v.2.

WPA v1 and WPA v2 add authentication to WEP encryption and key management. Key features of WPA privacy include:

- Specifies 802.1x with Extensible Authentication Protocol (EAP)
- Requires a RADIUS or other authentication server
- Uses RADIUS protocols for authentication and key distribution
- Centralizes management of user credentials

The encryption portion of WPA v1 is Temporal Key Integrity Protocol (TKIP). TKIP includes:

- A per-packet key mixing function that shares a starting key between devices, and then changes their encryption key for every packet (unicast key) or after the specified re-key time interval (broadcast key) expires
- An enhanced Initialization Vector (IV) of 48 bits, instead of 24 bits, making it more difficult to compromise
- A Message Integrity Check or Code (MIC), an additional 8-byte code that is inserted before the standard WEP 4-byte Integrity Check Value (ICV). These integrity codes are used to calculate and compare, between sender and receiver, the value of all bits in a message, which ensures that the message has not been tampered with.

The encryption portion of WPA v2 is Advanced Encryption Standard (AES). AES includes:

- A 128-bit key length, for the WPA2/802.11i implementation of AES
- Four stages that make up one round. Each round is iterated 10 times.

- A per-packet key mixing function that shares a starting key between devices, and then changes their encryption key for every packet or after the specified re-key time interval expires.
- The Counter-Mode/CBC-MAC Protocol (CCMP), a new mode of operation for a block cipher that enables a single key to be used for both encryption and authentication. The two underlying modes employed in CCM include:
  - Counter mode (CTR) that achieves data encryption
  - Cipher Block Chaining Message Authentication Code (CBC-MAC) to provide data integrity

The following is an overview of the WPA authentication and encryption process:

1. The wireless device client associates with Wireless AP.
2. Wireless AP blocks the client's network access while the authentication process is carried out (the SCALANCE IWLAN Controller sends the authentication request to the RADIUS authentication server).
3. The wireless client provides credentials that are forwarded by the SCALANCE IWLAN Controller to the authentication server.
4. If the wireless device client is not authenticated, the wireless client stays blocked from network access.
5. If the wireless device client is authenticated, the SCALANCE IWLAN Controller distributes encryption keys to the Wireless AP and the wireless client.
6. The wireless device client gains network access via the Wireless AP, sending and receiving encrypted data. The traffic is controlled with permissions and policy applied by the SCALANCE IWLAN Controller.

Wireless 802.11n APs and WPA Authentication

Note:
If you configure a WLAN Service to use either WEP or TKIP authentication, any Wireless 802.11n AP associated to a VNS using that service will be limited to legacy AP performance rates

If a VNS is configured to use WPA authentication, any Wireless 802.11n AP within that VNS will do the following:

- WPA v.1 — If WPA v.1 is enabled, the Wireless 802.11n AP will advertise only TKIP as an available encryption protocol.
- WPA v.2 — If WPA v.2 is enabled, the Wireless 802.11n AP will do the following:
  - If WPA v.1 is enabled, the Wireless 802.11n AP will advertise TKIP as an available encryption protocol.

Note:
If WPA v.2 is enabled, the Wireless 802.11n AP does not support the **Auto** option.

  - If WPA v.1 is disabled, the Wireless 802.11n AP will advertise the encryption cipher AES (Advanced Encryption Standard).

Note:
The security encryption for some network cards must not to be set to WEP or TKIP to achieve a data rate beyond 54 Mbps.

WPA Key Management Options

Wi-Fi Protected Access (WPA v1 and WPA v2) privacy offers you the following key management options:

- None — The wireless client device performs a complete 802.1x authentication each time it associates or tries to connect to a Wireless AP.
- Opportunistic Keying — Opportunistic Keying or opportunistic key caching (OKC) enables the client devices to roam fast and securely from one Wireless AP to another in 802.1x authentication setup.

  The client devices that run applications such as video streaming and VoIP require rapid reassociation during roaming. OKC helps such client devices by enabling them to rapidly reassociate with the Wireless APs. This avoids delays and gaps in transmission and thus helps in secure fast roaming (SFR).

Note:
The client devices should support OKC to use the OKC feature in the Siemens WLAN.

- Pre-authentication — Pre-authentication enables a client device to authenticate simultaneously with multiple Wireless APs in 802.1x authentication setup. When the client device roams from one Wireless AP to another, it does not have to perform the complete 802.1x authentication to reassociate with the new Wireless AP as it is already pre-authenticated with it. This reduces the reassociation time and thus helps in seamless roaming.

Note:
The client devices should support pre-authentication to use the pre-authentication feature in Siemens WLAN.

- Opportunistic Keying & Pre-auth — Opportunistic Keying and Pre-auth options is meant for environments where device clients supporting either authentication method (OKC or Pre-Auth) may be expected. The method that is used in each case is up to the individual client device.

Configuring WLAN Service Privacy

To Configure Privacy:

1. If the WLAN Service configuration page is not already displayed, from the top menu, click **VNS Configuration**. Then, in the left pane, select **WLAN Services**. The WLAN Services window displays.
2. Select the desired service to edit from the left pane. The WLAN Service configuration page is displayed.

3. Click the **Privacy** tab, then select the desired privacy method. The WLAN Services Privacy tab displays. Table 6-3 describes the WLAN services privacy tab fields and buttons.

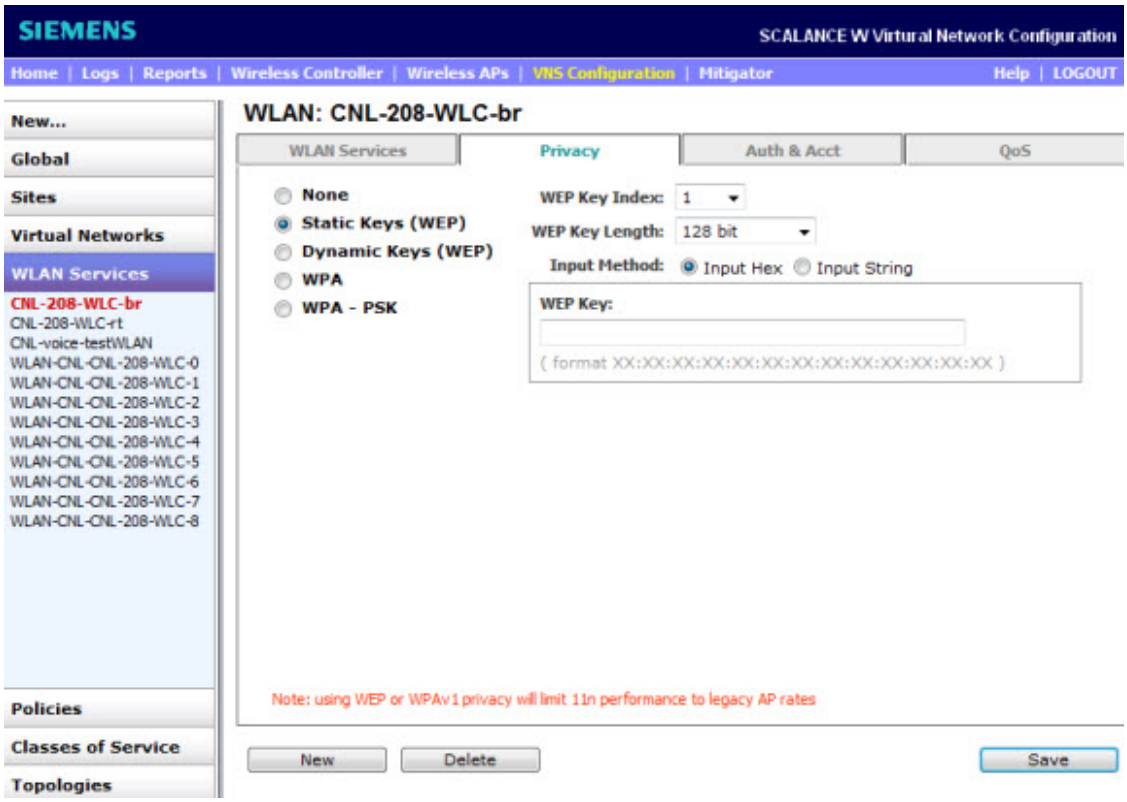


Table 6-3 WLAN Services Privacy Tab - Fields and Buttons

Field/Button	Description
None	Select to configure a WLAN service with no privacy settings.
Static Keys (WEP)	Select to configure static key (WEP) privacy settings.
WEP Key Index	From the **WEP Key Index** drop-down list, select the WEP encryption key index. Options are 1 to 4. This field is available only when configuring static keys.
WEP Key Length	From the **WEP Key Length** drop-down list, click the **WEP encryption key length**. Options are: 64-bit, 128-bit, and 152-bit. This field is available only when configuring static keys.
Input Method	Select one of the following input methods: • **Input Hex** — If you select **Input Hex**, type the WEP key input in the **WEP Key** box. The key is generated automatically, based on the input. • **Input String** — If you select **Input String**, type the secret WEP key string used for encrypting and decrypting in the **Strings** box. The WEP Key box is automatically filled by the corresponding Hex code. This field is available only when configuring static keys.
WEP Key	Type the WEP key using the input method chosen above.

Table 6-3 WLAN Services Privacy Tab - Fields and Buttons (continued)

Field/Button	Description
Dynamic Keys (WEP)	Select to configure dynamic keys (WEP) privacy settings.
WPA	Select to configure WPA privacy settings.
WPA - PSK	Select to configure dynamic keys (WEP) privacy settings.
WPA v.1	Select the checkbox to enable WPA v.1 encryption, and then select an encryption method: **Auto** — If you click Auto, the Wireless AP advertises both TKIP and CCMP (counter mode with cipher block chaining message authentication code protocol). CCMP is an IEEE 802.11i encryption protocol that uses the encryption cipher AES (Advanced Encryption Standard). Auto is the default. **AES only** — If you click AES, the Wireless AP advertises CCMP as an available encryption protocol. It will not advertise TKIP This field is available only when configuring WPA and WPA - PSK privacy settings.
WPA v.2	Select the checkbox to enable WPA v.2 encryption, and then select an encryption method: • **Auto** — If you click Auto, the Wireless AP advertises both TKIP and CCMP (counter mode with cipher block chaining message authentication code protocol). CCMP is an IEEE 802.11i encryption protocol that uses the encryption cipher AES (Advanced Encryption Standard). Auto is the default. • **AES only** — If you click AES, the Wireless AP advertises CCMP as an available encryption protocol. It will not advertise TKIP This field is available only when configuring WPA and WPA - PSK privacy settings.
Key Management Options	Click one of the following key management options: • **None** — The mobile units (client devices) perform a complete 802.1x authentication each time they associate or connect to a Wireless AP. • **Opportunistic Keying** — Enables secure fast roaming (SFR) of mobile units. For more information, see Configuring WLAN Service Privacy on 6-11. • **Pre-authentication** — Enables seamless roaming. For more information, see Configuring WLAN Service Privacy on 6-11. • **Opportunistic Keying & Pre-auth** — For more information, see Configuring WLAN Service Privacy on 6-11.
Broadcast re-key interval	To enable re-keying after a time interval, select the **Broadcast re-key interval** box, then type the time interval after which the broadcast encryption key is changed automatically. The default is 3600 seconds. If this checkbox is not selected, the Broadcast encryption key is never changed and the Wireless AP will always use the same broadcast key for Broadcast/Multicast transmissions which will reduce the level of security for wireless communications.

Table 6-3 WLAN Services Privacy Tab - Fields and Buttons (continued)

Field/Button	Description
Group Key Power Save Retry	To enable the group key power save retry The group key power save retry is only supported for W786C/ W788C Wireless APs.
Input Method	Select one of the following input methods: • **Input Hex** — If you select **Input Hex**, type the pre-shared key as hex characters. • **Input String** — If you select **Input String**, type the pre-shared key as a string of characters.
Pre-shared key String	In the **Pre-Shared Key** box, type the shared secret key to be used between the wireless device and Wireless AP. The shared secret key is used to generate the 256-bit key. To proofread your entry before saving the configuration, click **Unmask** to display the Pre-Shared Key. To mask the key, click **Mask**
Save	Click to save the configuration.

Configuring Accounting and Authentication

The next step in configuring a WLAN Service is to set up the authentication mechanism. There are various authentication modes available:

- None
- Internal Captive Portal
  - GuestPortal
  - GuestSplash
- 802.1x authentication, the wireless device user must be authenticated before gaining network access

Note:
You cannot configure accounting and authentication for a remote WLAN service. The authentication that you configure for the corresponding remoteable WLAN service applies to the remote WLAN service as well.

The first step for any type of authentication is to select RADIUS servers for the following:

- Authentication
- Accounting
- MAC-based authentication

Vendor Specific Attributes

In addition to the standard RADIUS message, you can include Vendor Specific Attributes (VSAs). The SCALANCE WLC711 authentication mechanism provides six VSAs for RADIUS and other authentication mechanisms (Table 6-4).

Table 6-4 Vendor Specific Attributes

Attribute Name	ID	Type	Messages	Description
Siemens-AP-Name	2	string	Sent to RADIUS server	The name of the AP the client is associating to. It can be used to assign policy based on AP name or location.
Siemens-AP-Serial	3	string	Sent to RADIUS server	The AP serial number. It can be used instead of (or in addition to) the AP name.
Siemens-VNS-Name	4	string	Sent to RADIUS server	The name of the Virtual Network the client has been assigned to. It is used in assigning policy and billing options, based on service selection.
Siemens-SSID	5	string	Sent to RADIUS server	The name of the SSID the client is associating to. It is used in assigning policy and billing options, based on service selection.
Siemens-BSS-MAC	6	string	Sent to RADIUS server	The name of the BSS-ID the client is associating to. It is used in assigning policy and billing options, based on service selection and location.
Siemens-Policy-Name	7	string	Sent to RADIUS server	The name of the policy applied to the station's session.
Siemens-Topology-Name	8	string	Sent to RADIUS server	The name of the topology applied to the station's session.
Siemens-Ingress-RC-Name	9	string	Sent to RADIUS server	The name of the rate limit applied to the station's session's outbound traffic.
Siemens-Egress-RC-Name	10	string	Sent to RADIUS server	The name of the rate limit applied to the station's session's inbound traffic.

The RADIUS message also includes RADIUS attributes Called-Station-Id and Calling-Station-Id to include the MAC address of the wireless device.

Note:
Siemens-URL-Redirection is supported by MAC-based authentication.

Defining Accounting Methods for a WLAN Service

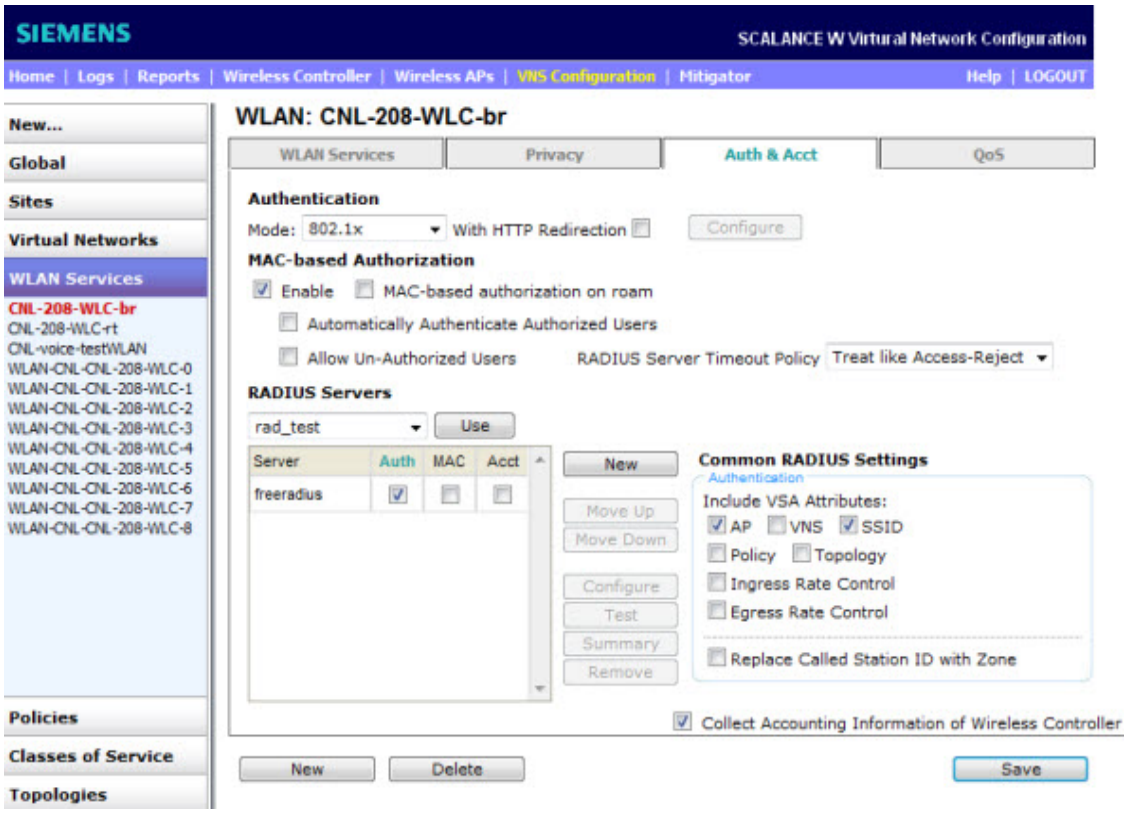
Accounting tracks the activity of wireless device users. There are two types of accounting available:

- **Controller accounting** — Enables the SCALANCE IWLAN Controller to generate Call Data Records (CDRs), containing usage information about each wireless session. CDR generation is enabled on a per VNS basis. For more information on CDRs, refer to section "Call Detail Records (CDRs)" on page 16-21.
- **RADIUS accounting** — Enables the SCALANCE IWLAN Controller to generate an accounting request packet with an accounting start record after successful login by the wireless device user, and an accounting stop record based on session termination. The SCALANCE IWLAN Controller sends the accounting requests to a remote RADIUS server.

SCALANCE IWLAN Controller accounting creates Call Data Records (CDRs). If RADIUS accounting is enabled, a RADIUS accounting server needs to be specified.

To Define Accounting Methods:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane expand the **WLAN Services** pane, then click the WLAN Service you want to define accounting methods for. The **WLAN Services** configuration page is displayed.
3. Click the **Auth & Acct** tab.

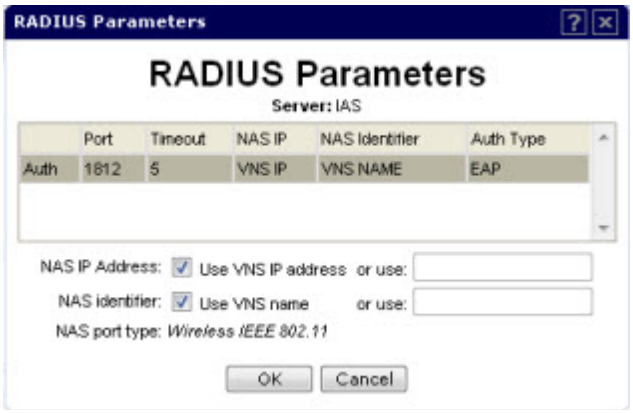


4. To enable Controller accounting, select **Collect Accounting Information of Wireless Controller**.
5. To enable RADIUS accounting, from the **RADIUS Servers** drop-down list, click the RADIUS server you want to use for RADIUS accounting, and then click **Use**.

   The server name is added to the **Server** table of assigned RADIUS servers. The selected server is no longer available in the **RADIUS servers** drop-down list.

   The RADIUS servers are defined on the **Global Settings** screen. For more information, see "Defining RADIUS Servers and MAC Address Format" on page 7-4.
6. In the **Server** table, select the checkbox in the **Acct** column to enable accounting for each applicable RADIUS server.
7. In the **Server** table click the RADIUS server, and then click **Configure**.The **RADIUS Parameters** dialog is displayed.

The configured values for the selected server are displayed in the table at the top.



8. For **NAS IP Address**, accept the default of "Use VNS IP address" or de-select the checkbox and type the IP address of a Network Access Server (NAS).
9. For **NAS Identifier**, accept the default of "Use VNS name" or type the Network Access Server (NAS) identifier. The NAS identifier is a RADIUS attribute that identifies the server responsible for passing information to designated RADIUS servers and then acting on the response returned.
10. Click **OK**.
11. To save your changes, click **Save**.

Configuring Authentication for a WLAN Service

- 802.1x Authentication — If 802.1x authentication mode is configured, the wireless device must successfully complete the user authentication verification prior to being granted network access. This enforcement is performed by both the user's client and the AP. The wireless device's client utility must support 802.1x. The user's EAP packets request for network access along with login identification or a user profile is forwarded by the SCALANCE IWLAN Controller to a RADIUS server.
- Captive Portal Authentication — For Captive Portal authentication, the wireless device connects to the network, but can only access the specific network destinations defined in the non-authenticated filter. For more information, see "Filtering Rules" on page 5-3. One of these destinations should be a server, either internal or external, which presents a Web login page — the Captive Portal. The wireless device user must input an ID and a password. This request for authentication is sent by the SCALANCE IWLAN Controller to a RADIUS server or other authentication server. Based on the permissions returned from the authentication server, the SCALANCE IWLAN Controller implements policy and allows the appropriate network access.

  Captive Portal authentication relies on a RADIUS server on the enterprise network. There are three mechanisms by which Captive Portal authentication can be carried out:

  – **Internal Captive Portal** — The SCALANCE IWLAN Controller displays the Captive Portal Web page, carries out the authentication, and implements policy.
- RADIUS servers — RADIUS servers can perform the following for a WLAN Service:

  – **Authentication** — RADIUS servers are configured to provide authentication.

- **MAC authentication** — RADIUS servers are configured to provide MAC-based authentication.
- **Accounting** — RADIUS servers are configured to provide accounting services.

MAC-Based Authentication for a WLAN Service

- MAC-based authentication — MAC-based authentication enables network access to be restricted to specific devices by MAC address. The SCALANCE IWLAN Controller queries a RADIUS server for a MAC address when a wireless client attempts to connect to the network.
- MAC-based authentication can be set up on any type of WLAN Service. To set up a RADIUS server for MAC-based authentication, you must set up a user account with UserID=MAC and Password=MAC (or a password defined by the administrator) for each user. Specifying a MAC address format and policy depends on which RADIUS server is being used.
- If MAC-based authentication is to be used in conjunction with the 802.1x or Captive Portal authentication, an additional account with a real UserID and Password must also be set up on the RADIUS server.

MAC-based authentication responses may indicate to the SCALANCE IWLAN Controller what VNS a user should be assigned to. Authentication (if enabled) can apply on every roam.

Assigning RADIUS Servers for Authentication

To Assign RADIUS Servers for Authentication:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane expand the **WLAN Services** pane, then click the WLAN Service. The **WLAN Services** configuration page is displayed.

3. Click the **Auth & Acct** tab.

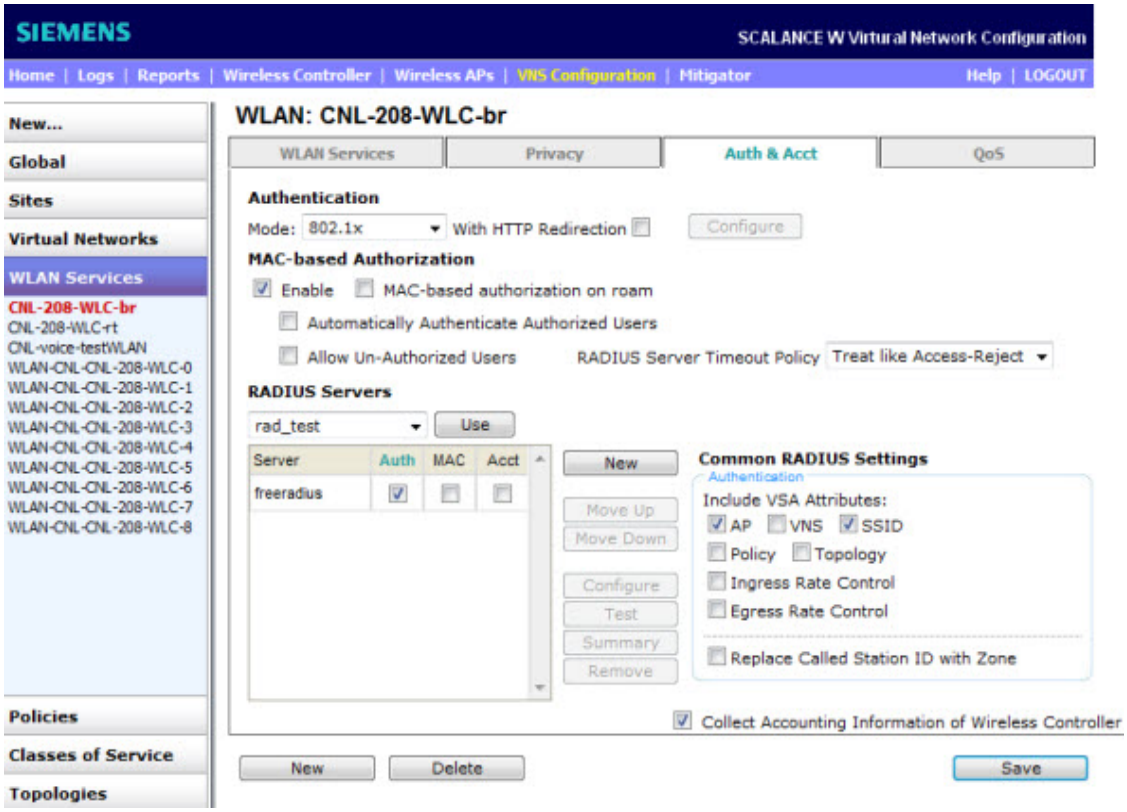


Table 6-5 WLAN Services Auth & Acct Tab - Fields and Buttons

Field/Button	Description
Authentication	
Mode	Select an authentication mode from the drop-down list: • Disabled • 802.1x • Internal • Guest Portal • Guest Splash
Configure	Click to configure the selected mode. For more information, see “Configuring Accounting and Authentication” on page 6-14.
MAC-based Authorization	
Enable	Select to enable the RADIUS server to perform MAC-based authentication for the VNS with Captive Portal.
MAC-based authorization on roam	Select to enable MAC-based authorization on roam.

Table 6-5 WLAN Services Auth & Acct Tab - Fields and Buttons (continued)

Field/Button	Description
Automatically Authenticate Authorized Users	Select to automatically authenticate authorized users. When set, a station that passes MAC-based authentication is treated as fully authorized. For example, its authentication state is set to fully authenticated. This can trigger a change to the policy applied to the station. If Captive Portal authentication is also configured on the WLAN Service, a station that passes MAC-based authentication will not have to pass Captive Portal authentication as well.
Allow Un-Authorized Users	Select to allow un-authorized users which permits stations that do not pass MAC-based authentication to stay on the network in an un-authorized state. The station can be confined to a "Walled Garden" by its assigned policy. If Captive Portal authentication is also configured on the WLAN Service, a station that fails MAC-based authentication can still become authorized by passing Captive Portal authentication. **Note:** Only select this checkbox if you want your clients to be authorized every time they roam to another Wireless AP. If this option is not enabled, and MAC-based authentication is in use, the client is authenticated only at the start of a session.
RADIUS Server Timeout Policy	Select a Radius Server Timeout Policy from the drop-down list.
RADIUS Servers	Select the server you want to assign to the WLAN Service from the drop-down list, then click **Use**. The server name is added to the Server table of assigned RADIUS servers. The selected server is no longer available in the RADIUS servers drop-down list. The RADIUS servers are defined on the Global Settings screen. For more information, see "Defining RADIUS Servers and MAC Address Format" on page 7-4. In the Server table, select the checkboxes in the Auth, MAC, or Acct columns, to enable the authentication or accounting, if applicable.
Common RADIUS Settings	Select the appropriate checkboxes to include the Vendor Specific Attributes (VSAs) in the message to the RADIUS server: • AP's • VNS's • SSID • Policy • Topology • Ingress Rate Control • Egress Rate Control For more information, see "Defining Common RADIUS Settings" on page 6-21.
Replace Called Station ID with Zone	Select this checkbox to allow the RADIUS client to send the AP Zone as the Called-Station ID instead of the radio MAC address. This feature can be enabled regardless of whether the Site is using centrally located or local RADIUS servers.

Table 6-5 WLAN Services Auth & Acct Tab - Fields and Buttons (continued)

Field/Button	Description
Collect Accounting Information of Wireless Controller	Select this checkbox to enable Controller accounting.

4. To save your changes, click **Save**.

Defining the RADIUS Server Priority for RADIUS Redundancy

If more than one server has been defined for any type of authentication, you can define the priority of the servers in the case of failover.

In the event of a failover of the main RADIUS server—if there is no response after the set number of retries—then the other servers in the list will be polled on a round-robin basis until a server responds.

If all defined RADIUS servers fail to respond, a critical message is generated in the logs.

To Define the RADIUS Server Priority for RADIUS Redundancy:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane expand the **WLAN Services** pane, then click the WLAN Service. The **WLAN Services** configuration page is displayed.
3. Click the **Auth & Acct** tab.
4. In the **Server** table, click the RADIUS server and then click **Move Up** or **Move Down** to arrange the order. The first server in the list is the active one.
5. To save your changes, click **Save**.

Configuring Assigned RADIUS Servers

Configuring assigned RADIUS servers for a VNS can include the following:

- Defining Common RADIUS Settings
- Defining RADIUS Settings for Individual RADIUS Servers
- Testing RADIUS Server Connections
- Viewing the RADIUS Server Configuration Summary
- Removing an Assigned RADIUS Server from a WLAN Service

Defining Common RADIUS Settings

To Define Common RADIUS Settings:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane expand the **WLAN Services** pane, then click the WLAN Service. The **WLAN Services** configuration page is displayed.
3. Click the **Auth & Acct** tab.

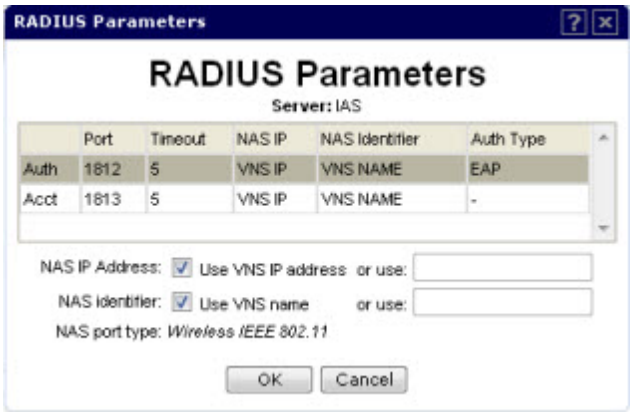
4. In the **Common RADIUS Settings** section, select the appropriate checkboxes to include the Vendor Specific Attributes in the message to the RADIUS server:
   - **AP's**
   - **VNS's**
   - **SSID**
   - **Policy**
   - **Topology**
   - **Ingress Rate Control**
   - **Egress Rate Control**
   - **Replace Called Station ID with Zone**

   The Vendor Specific Attributes must be defined on the RADIUS server.
5. To save your changes, click **Save**.

Defining RADIUS Settings for Individual RADIUS Servers

To Define RADIUS Settings for Individual RADIUS Servers:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane expand the **WLAN Services** pane, then click the WLAN Service. The **WLAN Services** configuration page is displayed.
3. Click the **Auth & Acct** tab.
4. In the **Server** table, click the RADIUS server you want to define, and then click **Configure**. The **RADIUS Parameters** dialog is displayed.



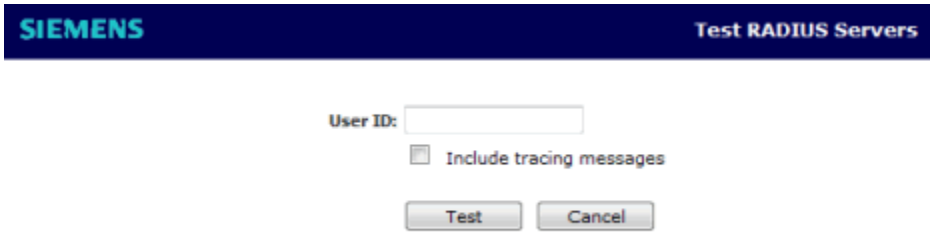
5. For **NAS IP Address**, accept the default of "Use VNS IP address" or de-select the checkbox and type the IP address of a Network Access Server (NAS).
6. For **NAS Identifier**, accept the default of "Use VNS name" or type the Network Access Server (NAS) identifier. The NAS identifier is a RADIUS attribute that identifies the server responsible for passing information to designated RADIUS servers and then acting on the response returned.
7. Click **OK**.

8. To save your changes, click **Save**.

Testing RADIUS Server Connections

To Test RADIUS Server Connections:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane expand the **WLAN Services** pane, then click the WLAN Service. The **WLAN Services** configuration page is displayed.
3. Click the **Auth & Acct** tab.
4. In the **Server** table, click the RADIUS server whose connection you want to test, and then click **Test**. The **Test RADIUS Servers** screen is displayed.



   The RADIUS test is a test of connectivity to the RADIUS server, not of full RADIUS functionality. The SCALANCE IWLAN Controller's RADIUS connectivity test initiates an access-request, to which the RADIUS server will respond. If a response is received (either access-reject or access-accept), then the test is deemed to have succeeded. If a response is not received, then the test is deemed to have failed. In either case, the test ends at this point.

   If the WLAN Service Authentication mode is Internal Captive Portal, or if MAC-Based Authorization is selected, then this test can also test a user account configured on the RADIUS server. In these cases, if proper credentials are filled in for **User ID** and **Password**, an access-accept could be returned.

   If the WLAN Service Authentication mode is 802.1x, however, an Access-Reject is expected if the RADIUS server is accessible, and the test is considered a success.

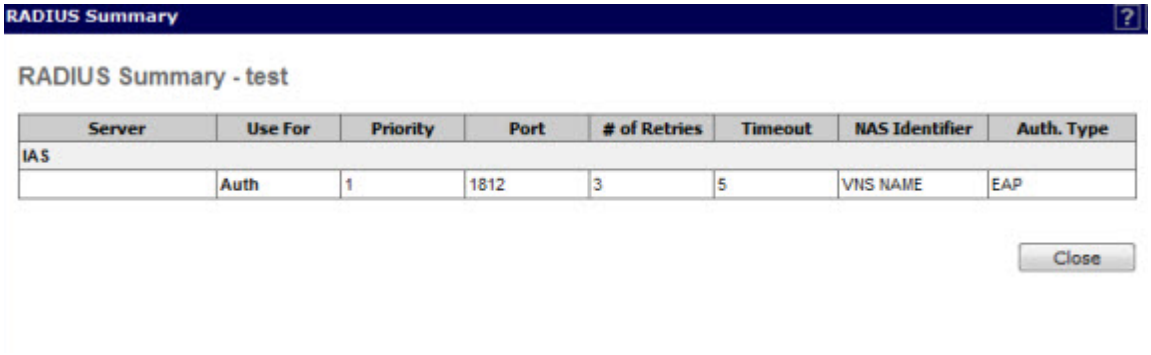
5. In the **User ID** box, type the user ID that you know can be authenticated.
6. In the **Password** box, type the corresponding password. A password is not required for a AAA VNS.
7. Click **Test**. The **Test Result** screen is displayed.
8. Click **Close** after reviewing the test results.
9. To save your changes, click **Save**.

Viewing the RADIUS Server Configuration Summary

To View the RADIUS Server Configuration Summary:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane expand the **WLAN Services** pane, then click the WLAN Service. The **WLAN Services** configuration page is displayed.

3. Click the **Auth & Acct** tab.
4. In the **Server** table, click a RADIUS server whose configuration summary you want to view, and then click **Summary**. The **RADIUS Summary** screen is displayed.



5. Click **Close**.
6. To save your changes, click **Save**.

Removing an Assigned RADIUS Server from a WLAN Service

To Remove an Assigned RADIUS Server from a WLAN Service:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane expand the **WLAN Services** pane, then click the WLAN Service you want to define accounting methods for. The **WLAN Services** configuration page is displayed.
3. Click the **Auth & Acct** tab.
4. In the **Server** table, click the assigned RADIUS server that you want to remove from the VNS, and then click **Remove**. The RADIUS server is removed from the VNS.
5. To save your changes, click **Save**.

Defining a WLAN Service with No Authentication

You can set up a WLAN Service that will bypass all authentication mechanisms and run the SCALANCE WLC711 with no authentication of a wireless device user.

A WLAN Service with no authentication can still control network access using filtering rules. For more information on how to set up filtering rules that allow access only to specified IP addresses and ports, see "Filtering Rules" on page 5-3.

To Define a WLAN Service with No Authentication:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane expand the **WLAN Services** pane, then click the WLAN Service you want to configure or click **New**. The **WLAN Services** configuration page is displayed.
3. Configure the service as described in "WLAN Services Overview" on page 6-1.
4. Click the **Auth & Acct** tab.
5. From the **Authentication Mode** drop-down list, select Disabled.

6. To save your changes, click **Save**.

Configuring Captive Portal for Internal Authentication

Captive Portal allows you to require network users to complete a defined process, such as logging in or accepting a network usage policy, before accessing the internet.

The Captive Portal options are:

- **802.1x -** Define the parameters of the external Captive Portal page displayed by an external server. The authentication can be carried out by an external authentication server or by the **SCALANCE IWLAN Controller** request to a RADIUS server.
- **Internal Captive Portal** — Define the parameters of the internal Captive Portal page displayed by the SCALANCE IWLAN Controller, and the authentication request from the SCALANCE IWLAN Controller to the RADIUS server.
- **GuestPortal** — Define the parameters for a GuestPortal Captive Portal page. A GuestPortal provides wireless device users with temporary guest network services.
- **Guest Splash** — Define the parameters of the Guest Splash page displayed by the SCALANCE IWLAN Controller. These parameters are similar to those for an internal Captive Portal page, except that the options to configure the labels for user id and password fields are not present since login information is not required when the user is re-directed to the authorization Web page. This type of Captive Portal could be used where the user is expected to read and accept some terms and conditions before being granted network access.

Note:
The SCALANCE IWLAN Controller does not support External Captive Portal at this time.

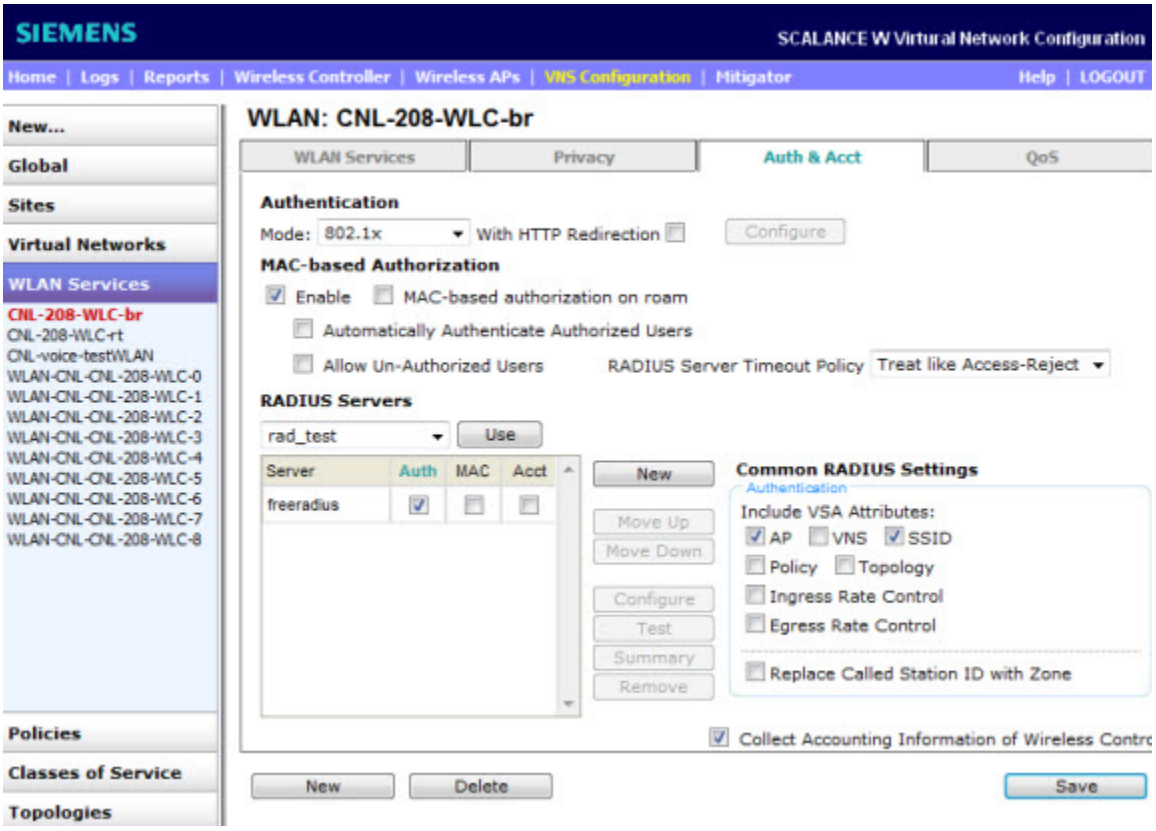
Configuring Basic Captive Portal Settings

When configuring captive portal, different settings become available depending on the captive portal option you choose.

To Configure the Captive Portal Settings:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane expand the **WLAN Services** pane, then click the WLAN Service. The **WLAN Services** configuration page is displayed.

3. Click the **Auth & Acct** tab. The Auth & ACCT page displays.



4. In the **Authentication Mode** drop-down list, select a Captive Portal option:
   - Disabled
   - 802.1x
   - Internal
   - Guest Portal
   - Guest Splash
5. Click Configure. The Captive Portal configuration page displays. The page display differs depending on the mode selected. See Figure 6-1 for Internal and Splash modes,Figure 6-2 for 802.1x mode, and Figure 6-3 for GuestPortal mode. Use the fields and buttons available on each page to configure Captive Ports.

   Table 6-6 describes the internal captive portal configuration fields and buttons. Table 6-8 describes the external captive portal configuration fields and buttons. Use these field and button descriptions to configure captive portal.

Figure 6-1 Captive Portal Page Configuration Page for Internal and Guest Splash Modes

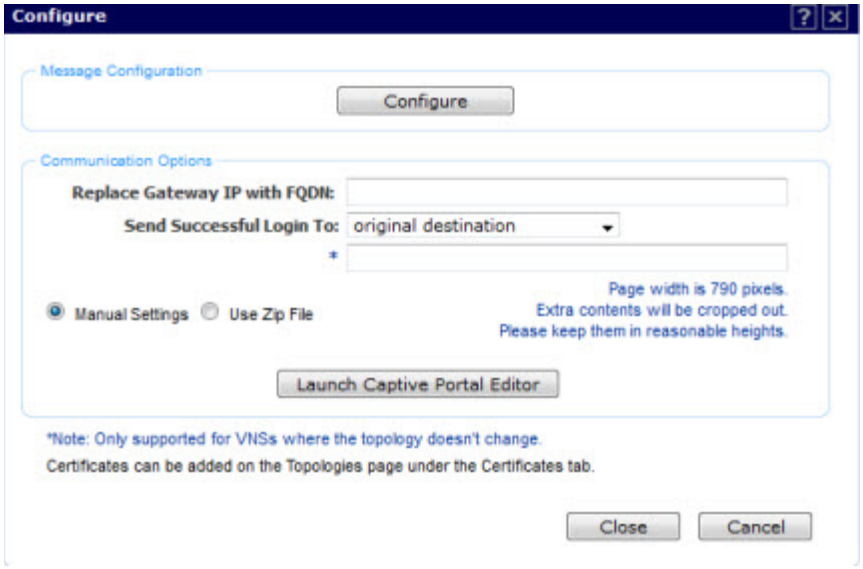


Figure 6-2 Captive Portal Page for 802.1x Modes

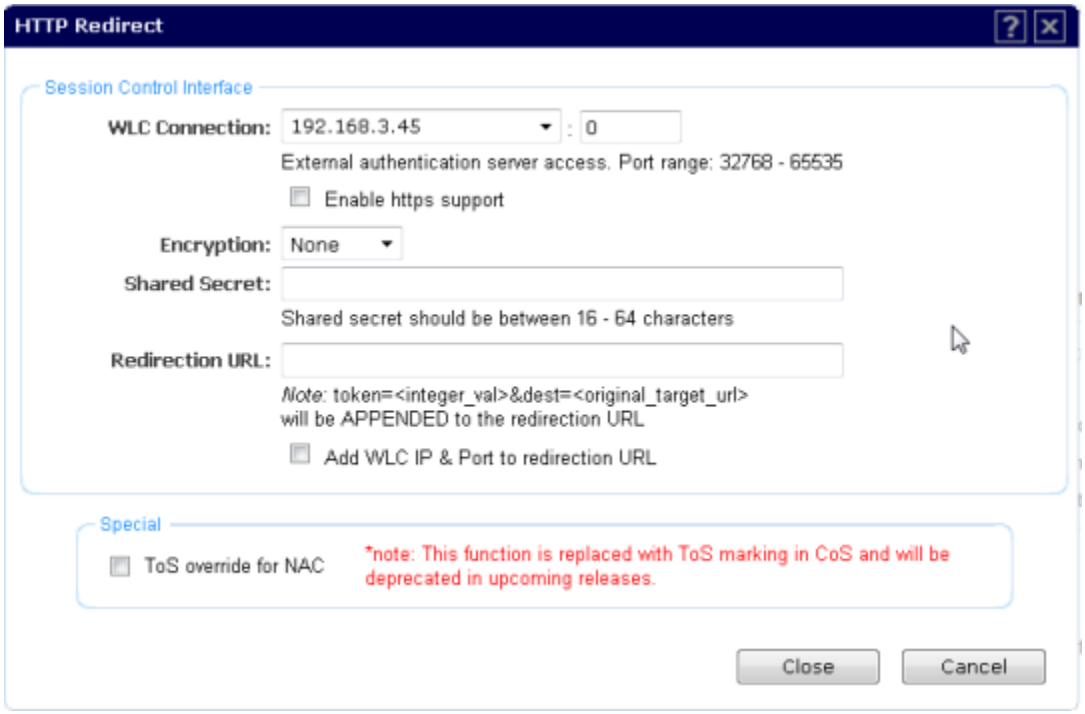


Figure 6-3 Captive Portal Page for Guest Portal Mode

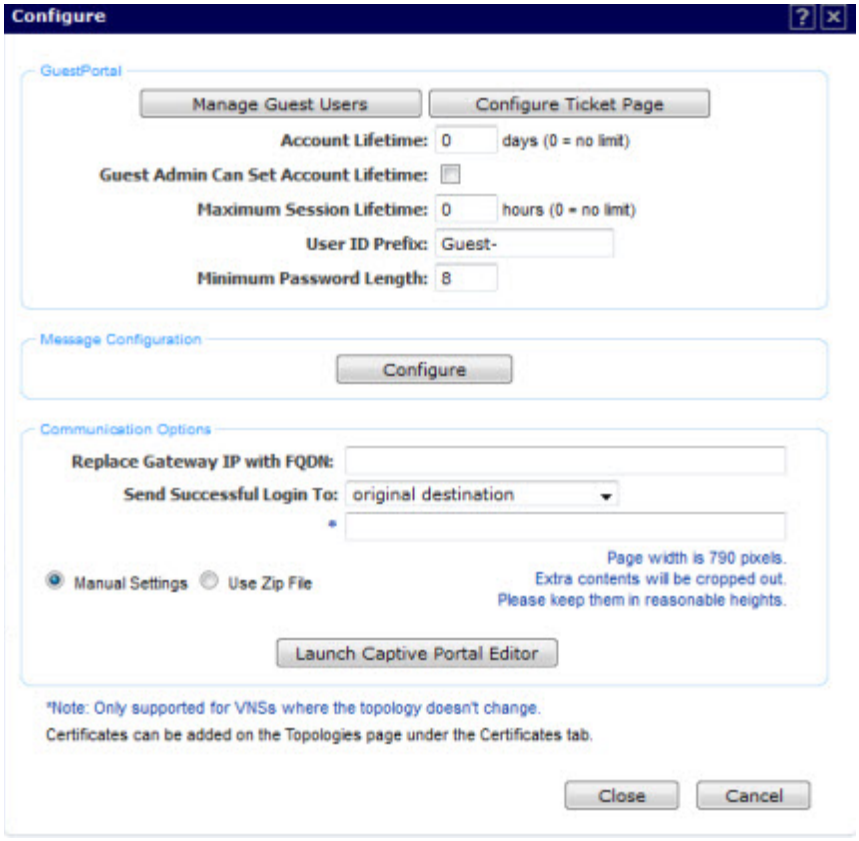

Configure
GuestPortal
Manage Guest Users
Configure Ticket Page
Account Lifetime: 0 days (0 = no limit)
Guest Admin Can Set Account Lifetime:
Maximum Session Lifetime: 0 hours (0 = no limit)
User ID Prefix: Guest-
Minimum Password Length: 8
Message Configuration
Configure
Communication Options
Replace Gateway IP with FQDN:
Send Successful Login To: original destination
Manual Settings
Use Zip File
Page width is 790 pixels.
Extra contents will be cropped out.
Please keep them in reasonable heights.
Launch Captive Portal Editor
*Note: Only supported for VNSs where the topology doesn't change.
Certificates can be added on the Topologies page under the Certificates tab.
Close
Cancel

Table 6-6 Configure Internal Captive Portal Page - Fields and Buttons

Field/Button	Description
Guest Portal - this section becomes available only when configuring a Guest Portal.	
Manage Guest Users	Click to add and configure guest user accounts. The Manage Guest Users page displays. For information about adding and managing guest users, see “Working with GuestPortal Administration” on page 19-1
Configure Ticket Page	Click to configure the guest portal ticket. The Configure ticket page displays. For information about how guest portal ticket pages and how to activate them, see “Working with GuestPortal Administration” on page 19-1.
Account Lifetime	Type the account lifetime, in days, for the guest account. A value of 0 specifies no limit to the account lifetime.
Guest Admin Can Set Account Lifetime	Select to enable the guest administrator to set the amount of time for which this account will be active.
Maximum Session Lifetime	Type the maximum session lifetime, in hours, for the guest account. The default 0 value does not limit a session lifetime. The session lifetime is the allowed cumulative total in hours spent on the network during the account lifetime.
User ID Prefix	Type a prefix that will be added to all guest account user IDs. The default is **Guest**.

Table 6-6 Configure Internal Captive Portal Page - Fields and Buttons (continued)

Field/Button	Description
Minimum Password Length	Type a minimum password length that will be applied to all guest accounts.
Message Configuration	
Configure	Click to configure error messages that may display on the internal captive portal page. The Message Configuration page displays (Table 6-7).
Communication Options	
Replace Gateway IP with FDQN	Type the appropriate name if a Fully Qualified Domain Name (FQDN) is used as the gateway address.
Send Successful Login To:	
Manual Settings	Select this option if you want to manually define the elements on the Captive Portal page. When you select this option, you enable the Launch Captive Portal Editor button.
Use Zip File	Select this option to upload a zip file that contains custom Captive Portal content. The zip file you upload must have a flat structure — it cannot contain any sub-directories. The contents of the zip must adhere to the following file formats: • Content to be used in the captive portal login page must be in a file named login.htm • Content to be used in the captive portal index page must be in a file named index.htm. • The number of graphics and the size of the graphics is unlimited, and can be either .gif, .jpg, or .png.
Upload Zip File	Click the Browse button and navigate to the zip file to use for setting up the captive portal.
View Sample Login Page	Click to view the sample login page for this captive portal.
View Sample Index Page	Click to view the sample index page for this captive portal.
Download	Click to download the specified zip file. The File Download page displays.
Launch Captive Portal Editor	Click to launch the Captive Portal Editor. Using the Captive Portal Editor (Figure), you can configure the elements on the captive portal page. This button becomes available when you select the Manual Setting radio button.
Close	Click to save your changes and close this page.
Cancel	Click to discard your configuration changes and close this page.

Error Message Configuration

You can configure informational and error messages that a user may encounter when trying to access a captive portal.

To configure the error and informational messages:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane expand the **WLAN Services** pane, then click the WLAN Service. The **WLAN Services** configuration page is displayed.
3. Click the **Auth & Acct** tab. The Auth & Accounting page displays.
4. In the **Authentication Mode** drop-down list, select a Captive Portal option.
5. Click Configure. The Captive Portal Configuration page displays.
6. In the Message Configuration section, click the Configure button. The Message Configuration page displays. Table 6-7 describes the message configuration fields and buttons.

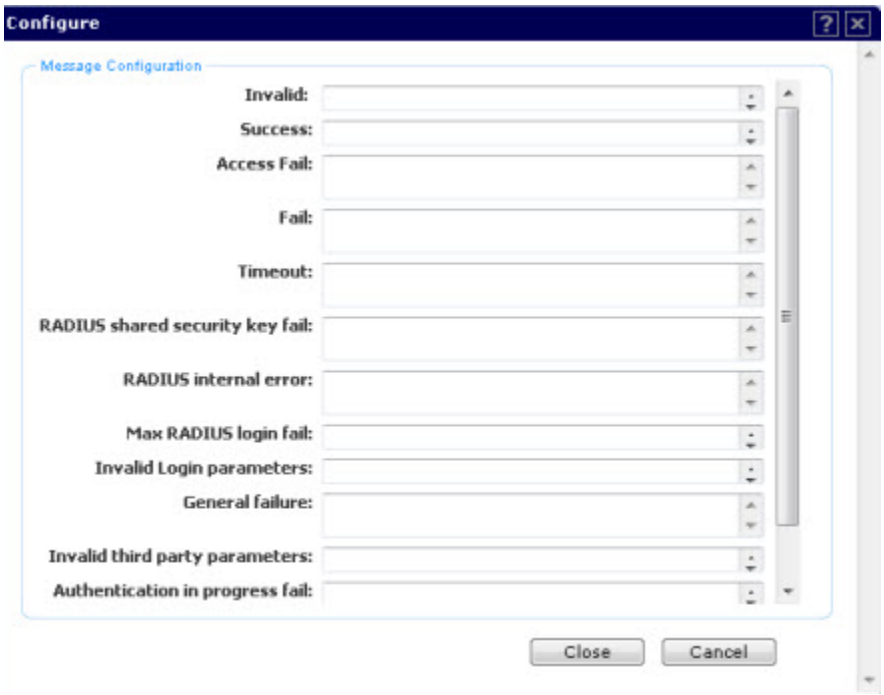


Table 6-7 Message Configuration Page - Fields and Buttons

Field/Button	Description
Invalid	Enter a message indicating that the user entered an invalid username or password combination.
Success	Enter a message to indicate when a user successfully logs in.
Access Fail	Enter an error message that indicates the a user login was unsuccessful.
Fail	Enter a message indicating an internal error.
Timeout	Enter an error message indicating that the user authentication timed out.
RADIUS shared secret security key fail	Enter an error message indicating that RADIUS shared secret failed.
RADIUS internal error	Enter an error message indicating an internal RADIUS client error

Table 6-7 Message Configuration Page - Fields and Buttons (continued)

Field/Button	Description
Max RADIUS login fail	Enter a message that indicates that the maximum number of simultaneous captive portal logins have been reached.
Invalid Login parameters	Enter a message indicating that the user entered an invalid username or password combination.
General failure	Enter a message indicating that a general failure has occurred.
Invalid third party parameters	Enter an error message indicating that one or more parameters passed from the external captive portal server to the controller is either invalid or missing.
Authentication in progress fail	Enter a message indicating that the user credentials were not authenticated.
Topology Change	Enter an error message indicating that the topology failed.
Close	Click to save your changes and close this page.
Cancel	Click to discard your configuration changes and close this page.

Using the Captive Portal Editor

The Captive Portal Editor enables you to configure the look and feel of a captive portal page.

To launch the captive Portal Editor:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane expand the **WLAN Services** pane, then click the WLAN Service. The **WLAN Services** configuration page is displayed.
3. Click the **Auth & Acct** tab. The Auth & Accounting page displays.
4. In the **Authentication Mode** drop-down list, select a Captive Portal option.
5. Click Configure. The Captive Portal Configuration page displays.
6. In the Communications Options section, select Manual Settings and then click the Launch Captive Portal Editor button. The Captive Portal Editor page displays. Table 6-8 describes the captive portal editor fields and buttons.

Note:
The Captive Portal Editor page supports only one administrator editing a captive portal page at one time.

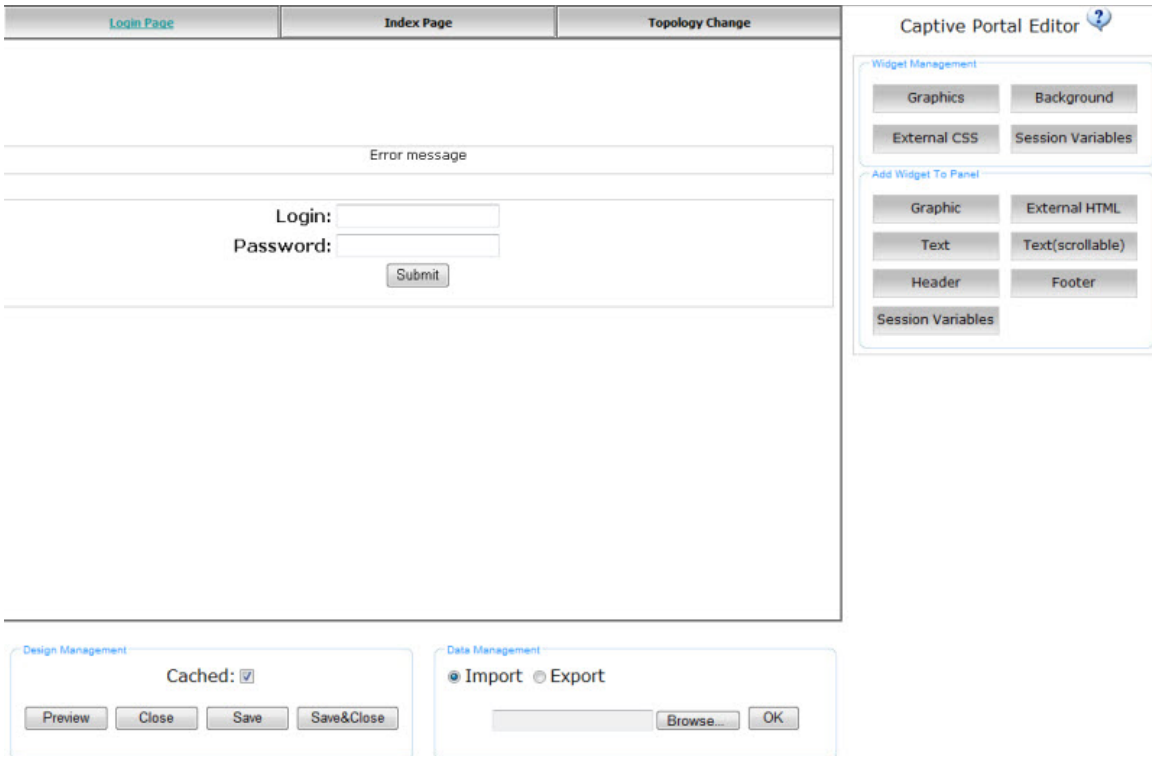


Table 6-8 Captive Portal Editor - Fields and Buttons

Field/Button	Description
Login Page tab	Click to view and configure the elements that will display on the Captive Portal login page. By default, widgets for a Login username and Password, as well as an Accept button are configured by default. You can accept or change these widgets using the Captive Portal Editor widget management tools in the right-hand panel. Using the Captive Portal Editor widget management tools in the right-hand pane on this page you can: • configure the background colors and forms • add graphics • add an external cascading style sheet (.CSS) • VSA attributes

Table 6-8 Captive Portal Editor - Fields and Buttons (continued)

Field/Button	Description
Index Page Tab	Click to view and configure the elements that will display on the Captive Portal Index page. Using the Captive Portal Editor widget management tools in the right-hand pane on this page you can: • configure the background colors and forms • add graphics • add a Logoff button. The Logoff button launches a pop-up logoff page, allowing users to control their logoff. • add a Status Check button The Status check button launches a pop-up window, which allows users to monitor session statistics such as system usage and time left in a session. • add an external cascading style sheet (.CSS)
Topology Change Tab	Click to view and configure the elements that will display on the Captive Portal Topology change page. By default, a login confirmation and informational message, as well as a Close button, are preconfigured. You can accept or change these elements using the Captive Portal Editor widget management tools in the right-hand panel. Using the Captive Portal Editor widget management tools in the right-hand pane on this page you can: • configure the background colors and forms • add graphics • add an external cascading style sheet (.CSS)
Design Management	
Cached	Select to cache most of the widgets from the design to rescue the amount of time it takes a captive portal page to load.
Preview	Select to view the way the configured widgets will display to a user.
Close	Select to close this page without saving the configuration.
Save	Select to save the configuration changes.
Save&Close	Select to save the configuration changes and close this window.
Data Management	
Import	Select and click Browse to navigate to the directory and filename of the a configuration that you want to import. Click OK to import the configuration.
Export	Select to save this configuration and enter the name of the file you want to save it in. Click the Browse button to navigate to a directory where you want to store the configuration file. Click OK. to save the configuration.
Widget Management	Use the fields in this section to configure the widgets.
Graphics	Click to locate and upload a graphic. The graphic becomes available in the Show Images section of the Property Editor.
Background	Click to configure the background color of the page

Table 6-8 Captive Portal Editor - Fields and Buttons (continued)

Field/Button	Description
External CSS	Click to identify a cascading style sheet (.CSS) that will determine the page format.
Session Variables	Click to configure the following VSA attributes: • AP Serial • AP Name • VNS Name • SSID • MAC Address The selections influence what URL is returned in either section. For example, wireless users can be identified by which Wireless AP or which VNS they are associated with, and can be presented with a Captive Portal Web page that is customized for those identifiers.
Add Widget to Panel	Use the fields in this section to add the configured widgets to the page.
Graphic	Select to add a graphic to the page. Use the Property Editor select a preconfigured graphic, and to determine the size and location of the graphic.
Text	Select to add text to the page. Use the Property Editor to type and format the text, and to determine the location of the text and the conditions under which it displays.
Header	Select to add a Header attribute to the panel. Use the Property Editor to determine the size and position of the Header attribute, the conditions under which it displays, and identify the link and type of Header attribute to include.
Session Variables	Use the Property Editor to determine the size and position of the Header attribute and the conditions under which it displays, select a Display Option, and select a type of VSA.
External HTML	Select to add an external HTML link to the page. Use the Property Editor select a preconfigured graphic, and to determine the size and location of the graphic
Text (Scrollable)	Select to add scrollable text to the page. Use the Property Editor to type and format the text, and to determine the location of the text and the conditions under which it displays.
Footer	Select to add a Footer attribute to the panel. Use the Property Editor to determine the size and position of the Footer attribute, the conditions under which it displays, and identify the link and type of Footer attribute to include.

NOTICE

In order for Captive Portal authentication to be successful, all the URLs referenced in the Captive Portal setup must also be specifically identified and allowed in the non-authenticated filter. For more information, see “Filtering Rules” on page 5-3.

NOTICE

If you use logos or graphics, ensure that the graphics or logos are appropriately sized. Large graphics or logos may force the login section out of view.

Configuring the QoS Policy

The following is an overview of the steps involved in configuring the QoS for WLAN Services.

Step 1 — Define the QoS Mode for the Service:

- **Legacy** — Enables DL (downlink) classification for all clients
- **WMM**:
  - Enables WMM support
  - Enables DL classification for WMM clients
  - Enables UL (uplink) classification in WMM clients
- **802.11e**:
  - Enables 802.11e support
  - Enables DL classification for 802.11e clients
  - Enables UL classification in 802.11e clients

  WMM and 802.11e are similar, but they use different signaling (same as WPA and WPA2).

Step 2 — Enable Turbo Voice:

- Ensures traffic is optimized for voice performance and capacity
- Can be enabled or disabled on individual WLAN Services
  - If Turbo Voice is enabled, together with QoS modes **Legacy**, **WMM**, or **802.11e**, DL voice traffic is sent via Turbo Voice queue instead of voice queue. A separate turbo voice queue allows for some VNSs to use the Turbo Voice parameters for voice traffic, while other VNSs use the voice parameters for voice traffic.
  - If WMM mode is also enabled, WMM clients use Turbo Voice-like contention parameters for UL voice traffic.
  - If 802.11e mode is also enabled, 802.11e clients use Turbo Voice-like contention parameters for UL voice traffic.

Note:
The Wireless 802.11n AP does not support the Turbo Voice option.

Step 3 — Define the DSCP and Service Class Classifications:

All 64 DSCP code-points are supported. The IETF defined codes are listed by name and code. Undefined codes are listed by code. The following is the default DSCP service class classification (where SC is Service Class and UP is User Priority):

Table 6-9 DSCP Code-Points

DSCP	SC/UP	DSCP	SC/UP	DSCP	SC/UP
CS0/DE	2/0	AF11	2/0	AF33	4/4

Table 6-9 DSCP Code-Points (continued)

DSCP	SC/UP	DSCP	SC/UP	DSCP	SC/UP
CS1	0/1	AF12	2/0	AF41	5/5
CS2	1/2	AF13	2/0	AF42	5/5
CS3	3/3	AF21	3/3	AF43	5/5
CS4	4/4	AF22	3/3	EF	6/6
CS5	5/5	AF23	3/3	Others	0/1
CS6	6/6	AF31	4/4		
CS7	7/7	AF32	4/4		

Step 4 — If Preferred Instead of DSCP Classification, Enable Priority Override:

- Click the applicable service class and implicitly desired UP
  - Updates UP in user packet
  - Updates UP for WASSP frame (if field exists) sent by AP
- Select the desired DSCP
  - Updates DSCP for WASSP frames sent by AP
  - Does not change DSCP in user packet

Step 5 — Configure the Advanced Wireless QoS:

- Enable the **Unscheduled Automatic Power Save Delivery** (U-APSD) feature
- Works in conjunction with WMM and/or 802.11e, and it is automatically disabled if both WMM and 802.11e are disabled

Step 6 — Configure Global Admission Control:

- Enable admission control. Admission control protects admitted traffic against new bandwidth demands. Admission control is available for Voice and Video.
- If admission control is enabled, you can configure the UL and DL policies action.
- The UL and DL policies act as enforcement of a traffic management system. Depending on the TSPEC negotiation per traffic class, Voice and Video, you can configure what actions the Wireless AP takes when admitted traffic has violated its TSPEC.
  - You can configure the UL and DL policers per VNS
  - TSPEC statistics can be viewed in the **Admission Control Statistics by Wireless AP** display. For more information, see Chapter 16, **Working with Reports and Statistics**.

Defining Priority Level and Service Class

Voice over Internet Protocol (VoIP) using 802.11 wireless local area networks are enabling the integration of internet telephony technology on wireless networks. Various issues including Quality-of-Service (QoS), call control, network capacity, and network architecture are factors in VoIP over 802.11 WLANs.

Wireless voice data requires a constant transmission rate and must be delivered within a time limit. This type of data is called isochronous data. This requirement for isochronous data is in

contradiction to the concepts in the 802.11 standard that allow for data packets to wait their turn to avoid data collisions. Regular traffic on a wireless network is an asynchronous process in which data streams are broken up by random intervals.

To reconcile the needs of isochronous data, mechanisms are added to the network that give voice data traffic or another traffic type priority over all other traffic, and allow for continuous transmission of data.

To provide better network traffic flow, the SCALANCE WLC711 provides advanced Quality of Service (QoS) management. These management techniques include:

- **WMM (Wi-Fi Multimedia)** — Enabled on individual WLAN Services, is a standard that provides multimedia enhancements that improve the user experience for audio, video, and voice applications. WMM is part of the 802.11e standard for QoS.
- **IP ToS (Type of Service) or DSCP (Diffserv Codepoint)** — The ToS/DSCP field in the IP header of a frame is used to indicate the priority and Quality of Service for each frame. Adaptive QoS ensures correct priority handling of client payload packets tunneled between the controller and AP by copying the IP ToS/DSCP setting from client packet to the header of the encapsulating tunnel packet.

Defining the Service Class

Service class is determined by the combination of the following operations:

- The class of treatment given to a packet. For example, queuing or per hop behavior (PHB).
- The packet marking of the output packets (user traffic and/or transport).

Table 6-10 Service Classes

Service class name (number)	Priority level
Network Control (7)	7 (highest priority)
Premium (Voice) (6)	6
Platinum (video) (5)	5
Gold (4)	4
Silver (3)	3
Bronze (2)	2
Best Effort (1)	1
Background (0)	0 (lowest priority)

The service class is equivalent to the 802.1D UP (user priority).

Table 6-11 Relationship Between Service Class and 802.1D UP

SC name	SC Value	802.1d UP	AC	Queue
Network Control	7	7	VO	VO or TVO
Premium (voice)	6	6	VO	VO or TVO
Platinum (video)	5	5	VI	VI
Gold	4	4	VI	VI

Table 6-11 Relationship Between Service Class and 802.1D UP (continued)

SC name	SC Value	802.1d UP	AC	Queue
Silver	3	3	BE	BE
Bronze	2	0	BE	BE
Best Effort	1	2	BK	BK
Background	0	1	BK	BK

Configuring the Priority Override

Priority override allows you to define and force the traffic to a desired priority level. Priority override can be used with any combination, as displayed in Table 6-11. You can configure the service class and the DSCP values.

When **Priority Override** is enabled, the configured service class overrides the queue selection in the downlink and uplink direction, the 802.1P UP for the VLAN tagged Ethernet packets, and the UP for the wireless QoS packets (WMM or 802.11e) according to the mapping in Table 6-10. If **Priority Override** is enabled and the VNS is not locally bridged, the configured DSCP value is used to tag the IP header of the encapsulated packets. The AP does not override the DSCP in the IP header of the user packet.

QoS Modes

You can enable the following QoS modes for a WLAN Service:

- **Legacy** — If enabled, the AP will classify and prioritize the downlink traffic for all clients according to the same rules.
- **WMM** — If enabled, the AP will accept WMM client associations, and will classify and prioritize the downlink traffic for all WMM clients. WMM clients will also classify and prioritize the uplink traffic.
- **802.11e** — If enabled, the AP will accept WMM client associations, and will classify and prioritize the downlink traffic for all 802.11e clients. The 802.11e clients will also classify and prioritize the uplink traffic.
- **Turbo Voice** — If any of the above QoS modes are enabled, the Turbo Voice mode is available. If enabled, all the downlink traffic that is classified to the Voice (VO) AC and belongs to that VNS is transmitted by the AP via a queue called Turbo Voice (TVO) instead of the normal Voice (VO) queue. The TVO queue is tailored in terms of contention parameters and number of retries to maximize voice quality and voice capacity.

The APs are capable of supporting 5 queues. The queues are implemented per radio. For example, 5 queues per radio. The queues are:

Table 6-12 Queues

Queue Name	Purpose
AC_VO	Voice
AC_VI	Video
AC_BK	Background

Table 6-12 Queues (continued)

Queue Name	Purpose
AC_BE	Best Effort
AC_TVO	Turbo Voice

The SCALANCE IWLAN Controller supports the definition of 8 levels of user priority (UP). These priority levels are mapped at the AP to the best appropriate access class. Of the 8 levels of user priority, 6 are considered low priority levels and 2 are considered high priority levels.

WMM clients have the same 4 AC queues. WMM clients will classify the traffic and use these queues when they are associated with a WMM-enabled AP. WMM clients will behave like non-WMM clients—map all traffic to the Best Effort (BE) queue—when not associated with WMM-enabled AP.

The prioritization of the traffic on the downstream (for example, from wired to wireless) and on the upstream (for example, from wireless to wired) is dictated by the configuration of the WLAN Service and the QoS tagging within the packets, as set by the wireless devices and the host devices on the wired network.

Both Layer 3 tagging (DSCP) and Layer 2 (802.1d) tagging are supported, and the mapping conforms with the WMM specification. If both L2 and L3 priority tags are available, then both are taken into account and the chosen AC is the highest resulting from L2. If only one of the priority tags is present, it is used to select the queue. If none is present, the default queue AC_BE is chosen.

Note:
If the wireless packets to be transmitted must include the L2 priority (send to a WMM client from a WMM-enabled AP), the outbound L2 priority is copied from the inbound L2 priority if available, or it is inferred from the L3 priority using the above table if the L2 inbound priority is missing.

Table 6-13 Traffic Prioritization

VNS type	Packet Source	Packet type	L2	L3
Tunneled	Wired	Untagged	No	Yes
Branch	Wired	VLAN tagged	Yes	Yes
Branch	Wired	Untagged	No	Yes
Branch or Tunneled	Wireless	WMM	Yes	Yes
Branch or Tunneled	Wireless	non-WMM	No	Yes

To Configure QoS Policy:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane expand the **WLAN Services** pane, then click the WLAN Service. The **WLAN Services** configuration page is displayed.

3. Click the **QoS** tab.

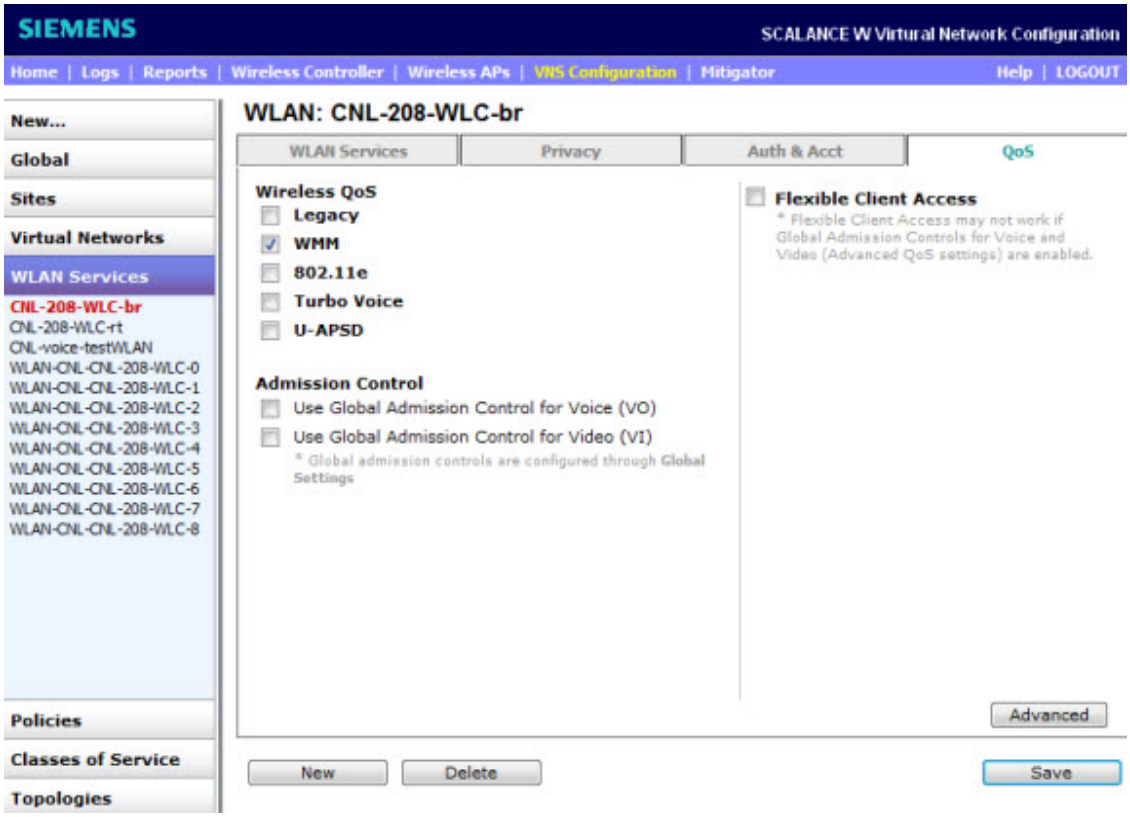


Table 6-14 WLAN Services QoS Tab - Fields and Buttons

Field/Button	Description
Wireless QoS	From the **Wireless QoS** list, do the following: **Legacy** — Select if your service will support legacy devices. **WMM** — Select to enable the AP to accept WMM client associations, and classify and prioritize the downlink traffic for all WMM clients. Note that WMM clients will also classify and prioritize the uplink traffic. WMM is part of the 802.11e standard for QoS. If selected, the **Turbo Voice** and **Enable U-APSD** options are displayed. **802.11e** — Select to enable the AP to accept WMM client associations, and classify and prioritize the downlink traffic for all 802.11e clients. The 802.11e clients will also classify and prioritize the uplink traffic. If selected, the **Turbo Voice** and the **Enable U-APSD** options are displayed: **Turbo Voice** — Select to enable all downlink traffic that is classified to the Voice (VO) AC and belongs to that VNS to be transmitted by the AP via a queue called Turbo Voice (TVO) instead of the normal Voice (VO) queue. When **Turbo Voice** is enabled together with **WMM** or **802.11e**, the WMM and/or 802.11e clients in that VNS are instructed by the AP to transmit all traffic classified to VO AC with special contention parameters tailored to maximize voice performance and capacity. **Enable U-APSD** — Select to enable the Unscheduled Automatic Power Save Delivery (U-APSD) feature. This feature can be used by mobile devices to efficiently sustain one or more real-time streams while being in power-save mode. This feature works in conjunction with WMM and/or 802.11e, and it is automatically disabled if both WMM and 802.11e are disabled.
Admission Control	From the **Admission Control** list, do the following: **Use Global Admission Control for Voice (VO)** - Select to enable admission control for Voice. With admission control, clients are forced to request admission to use the high priority access categories in both downlink and uplink direction. Admission control protects admitted traffic against new bandwidth demands. For more information, see VNS Global Settings. **Use Global Admission Control for Video (VI)** - This feature is only available If admission control is enabled for Voice. With admission control, clients are forced to request admission to use the high priority access categories in both downlink and uplink direction. Admission control protects admitted traffic against new bandwidth demands.Select to provide distinct thresholds for VI (video). For more information, see VNS Global Settings.
Flexible Client Access	**Note:** Select the checkbox to enable flexible client access. Flexible client access levels are set as part of the VNS global settings.TSPEC must be disabled when using Flexible Client Access.

Table 6-14 WLAN Services QoS Tab - Fields and Buttons (continued)

Field/Button	Description
Advanced button	
Priority Processing	
Priority Override	Select this checkbox to force DSCP and a service class. **Note:** When **Priority Override** is enabled, the configured service class forces queue selection in the downlink direction, the 802.1P user priority for the VLAN tagged Ethernet packets and the user priority for the wireless QoS packets (WMM or 802.11e), according to the mapping between service class and user priority. If **Priority Override** is enabled and the VNS is not locally bridged, the configured DSCP value is used to tag the IP header of the encapsulated packets. The AP does not override the DSCP in the IP header of the user packet.
DSCP	From the drop-down list, click the DSCP value used to tag the IP header of the encapsulated packets.
Service Class	Select one of the following service classes: • Network control (7) — The highest priority level. • Premium (Voice) (6) • Platinum (5) • Gold (4) • Silver (3) • Bronze (2) • Best Effort (1) • Background (0) — The lowest priority level **Note:** If you want to assign a service class to each DSCP marking, clear the **Priority Override** checkbox and define the DSCP service class priorities in the DSCP classification table.
Advanced Wireless QoS options (options are only displayed if the WMM or 802.11e checkboxes are selected)	
UL Policer Action	If **Use Global Admission Control for Voice (VO)** or **Use Global Admission Control for Video (VI)** is enabled, click the action you want the Wireless AP to take when TSPEC violations occurring on the uplink direction are discovered: **Do nothing** — Click to allow TSPEC violations to continue when they are discovered. Data transmissions will continue and no action is taken against the violating transmissions. **Send DELTS to Client** — Click to end TSPEC violations when it they are discovered. This action deletes the TSPEC.

Table 6-14 WLAN Services QoS Tab - Fields and Buttons (continued)

Field/Button	Description
DL Policier Action	If **Use Global Admission Control for Voice (VO)** or **Use Global Admission Control for Video (VI)** is enabled, click the action you want the Wireless AP to take when TSPEC violations occurring on the downlink direction are discovered: **Do nothing** — Click to allow TSPEC violations to continue when they are discovered. Data transmissions will continue and no action is taken against the violating transmissions. **Downgrade** — Click to force the transmission's data packets to be downgraded to the next priority when a TSPEC violation is discovered. **Drop** — Click to force the transmission's data packets to be dropped when a TSPEC violation is discovered.

7

Configuring a VNS

This chapter describes VNS (Virtual Network Services) configuration, including:

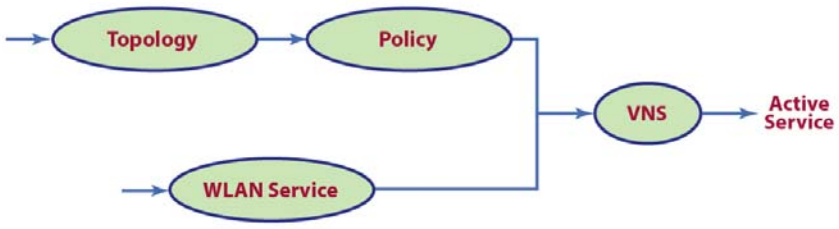
For information about...	Refer to page...
High Level VNS Configuration Flow	7-1
VNS Global Settings	7-3
Methods for Configuring a VNS	7-21
Manually Creating a VNS	7-21
Creating a VNS Using the Wizard	7-23
Enabling and Disabling a VNS	7-70
Renaming a VNS	7-71
Deleting a VNS	7-71

High Level VNS Configuration Flow

Setting up a VNS defines a binding between a default policy specified for wireless users and an associated WLAN Service set, as shown in Figure 7-1 below.

There are conceptually hierarchical dependencies on the configuration elements of a VNS. However, the provisioning framework is flexible enough that you may select an existing dependent element or create one on the fly. Therefore, each element can be provisioned independently (WLAN services, Topologies, and Policies). For service activation, all the pieces will need to be in place, or defined during VNS configuration.

Figure 7-1 VNS Configuration Flow



You can use the **VNS Creation Wizard** to guide you through the necessary steps to create a virtual network service (and the necessary subcomponents during the process). The end result is a fully resolved set of elements and an active service.

The recommended order of configuration events is:

1. Before you begin, draft out the type of services the system is expected to provide — wireless services, encryption types, infrastructure mapping (VLANs), and connectivity points (switch ports). Switch port VLAN configuration/trunks must match the controller's.
2. Set up basic controller services such as NTP, Routing, DNS, and RADIUS Servers, using one of the following methods:
   – Run the **Basic Configuration Wizard**, or
   – Manually define the necessary infrastructure components such as RADIUS Servers. RADIUS Servers are defined via the VNS Configuration > Global > Authentication tab.
3. Define Topologies. Topologies represent the controller’s points of network attachment. Therefore, VLANs and port assignments need to be coordinated with the corresponding switch ports.
4. Define Policies. Policies are typically bound to Topologies. Policy application assigns user traffic to the corresponding network point of attachment.
   – Policies define mobile user access rights by filtering.
   – Polices reference the mobile user's traffic rate control profiles.
5. Define the WLAN Service.
   – Define SSID and privacy settings for the wireless link.
   – Select the set of APs and Radios on which the service is present.
   – Configure the method of credential authentication for wireless users (None, Internal CP, GuestPortal, 802.1x[EAP]).
6. Create a **VNS** that binds the **WLAN Service** to the **Policy** that will be used for default assignment upon user network attachment.

   The VNS configuration page in turn allows for in-place creation of any dependencies it may require. For example:
   – Create a new WLAN Service.
   – Create a new Policy.
      - Create a new Topology.
      - Create a new Class of Service.

Controller Defaults

The default shipping SCALANCE IWLAN Controller configuration does not include any pre-configured WLAN Services, VNSs, or Policies.

The SCALANCE IWLAN Controller system ships with a Topology entity for an admin interface. Topology entities representing the controller physical interfaces must be set manually or using the basic installation wizard.

There are, however, global default settings corresponding to:

– A Default Topology named “Bridged @ AP Untagged”
– An “Unlimited” Rate Control Profile
– A Filter Definition of “Deny all”

These entities are simply placeholders for Policy completion, in case policies are incompletely defined. For example, a Policy may be defined as “no-change” for Topology assignment.

If an incomplete Policy is assigned as the default for a VNS / WLAN Service (wireless port), the incomplete Policy needs to be fully qualified, at which point the missing values are picked from the Default Global Policy definitions, and the resulting policy is applied as default.

Note:
You can edit the attributes of the Default Global Policy (in the VNS > Globals tab) to any other parameters of your choosing (for example, any other topology, more permissive filter sets, more restrictive Rate Control profile).

It is possible to define a Default Global Policy to refer to a specific Topology (for example, Topology_VLAN), and then configure every other Policy’s topology simply as “No-change.” This will cause the default assignment to Topology_VLAN, so that all user traffic, regardless of which policy they're currently using (with different access rights, different rate controls) will be carried through the same VLAN.

VNS Global Settings

Before defining a specific VNS, define the global settings that will apply to all VNS definitions. These global settings include:

- Authentication
  - Configuring RADIUS servers on the enterprise network. The defined servers are displayed as available choices when you set up the authentication mechanism for each WLAN Service.
  - Configuring the MAC format.
  - Configuring RFC 3580 (ACCESS -ACCEPT) RADIUS attributes for the selected server. A Policy Map Table maps each VLAN ID to a Policy ID.
- DAS (Dynamic Authorization Service)
  - Configuring Dynamic Authorization Service (DAS) support. DAS helps secure your network by providing the ability to disconnect a mobile device from your network.
- Wireless QoS, comprising Admission Control Thresholds and Flexible Client Access Fairness Policy.
  - Admission control thresholds protect admitted traffic against overloads, provide distinct thresholds for VO (voice) and VI (video), and distinct thresholds for roaming and new streams.
  - Flexible Client Access provides the ability to adjust media access fairness in five levels between Packet Fairness and Airtime Fairness.
- Bandwidth Control
  - The Bandwidth Control Profiles you define are displayed as available choices in the **Rate Profiles** menu when you set up CoS policy.

- Default Policy

  The Global Default Policy specifies:

  – A topology to use when a VNS is created using a policy that does not specify a topology

  – A set of filters

  The SCALANCE IWLAN Controller ships from the factory with a default “Global Default Policy” that has the following settings:

  – Topology is set to an Bridged at AP untagged topology. This topology will itself be defined in SCALANCE IWLAN Controllers by default.

  – Filters - A single “Allow All” filter.

  The Global Default Policy is user-configurable. Changes to the Global Default Policy immediately effect all shadow policies created from it, just as if the administrator had made a comparable change directly to the incomplete policy.

- Egress Filtering Mode

  The global egress filtering mode setting overrides the individual WLAN service egress filter mode setting.

- Sync Summary

  The “Sync Summary” screen provides an overview of the synchronization status of paired controllers. The screen is divided into 4 sections: Virtual Networks, WLAN services, Policies and Topologies. Each section lists the name of the corresponding configuration object, its synchronization mode, and the status of last synchronization attempt. For more information, see “Using the Sync Summary” on page 7-19.

Defining RADIUS Servers and MAC Address Format

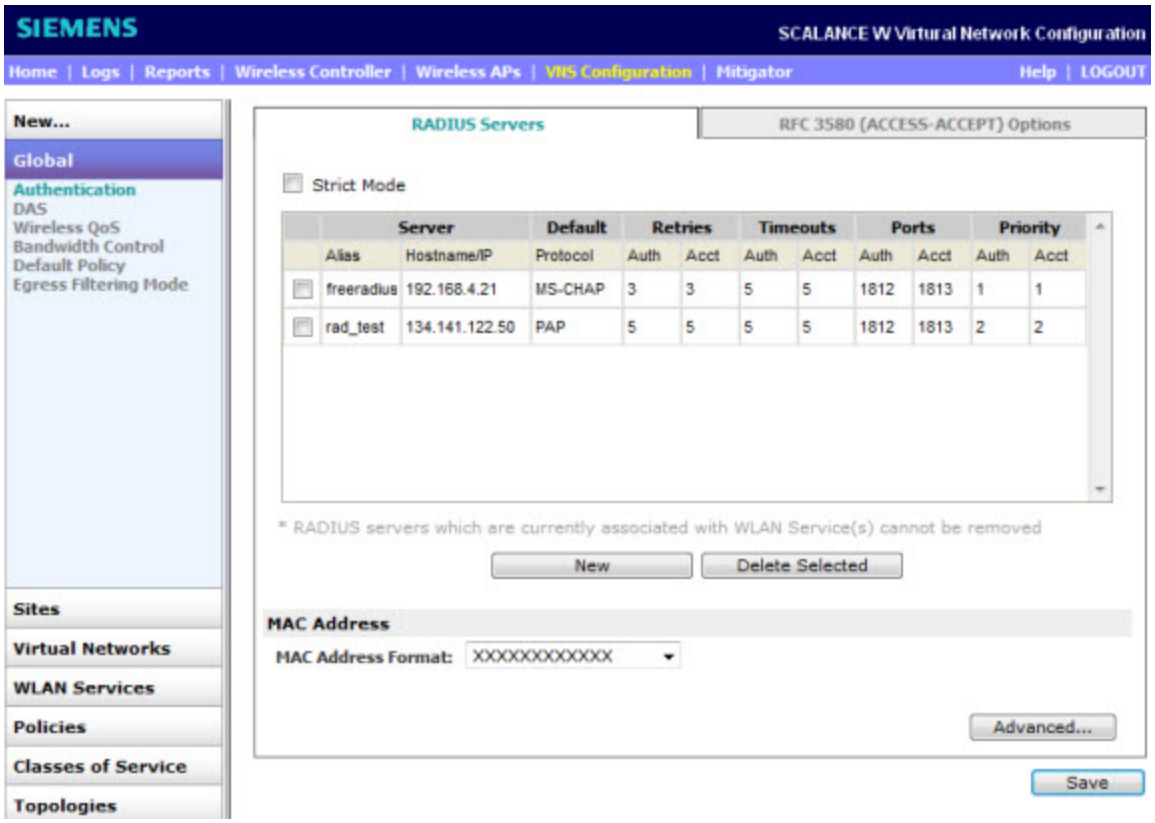
The Authentication global settings include configuring RADIUS servers, the MAC format to be used, the SERVICE-TYPE attribute in the client ACCESS-REQUEST messages, and how long a notice Web page displays if a topology change occurs during authentication. The notice Web page indicates that authentication was successful and that the user must restart the browser to gain access to the network.

Defining RADIUS Servers for VNS Global Settings

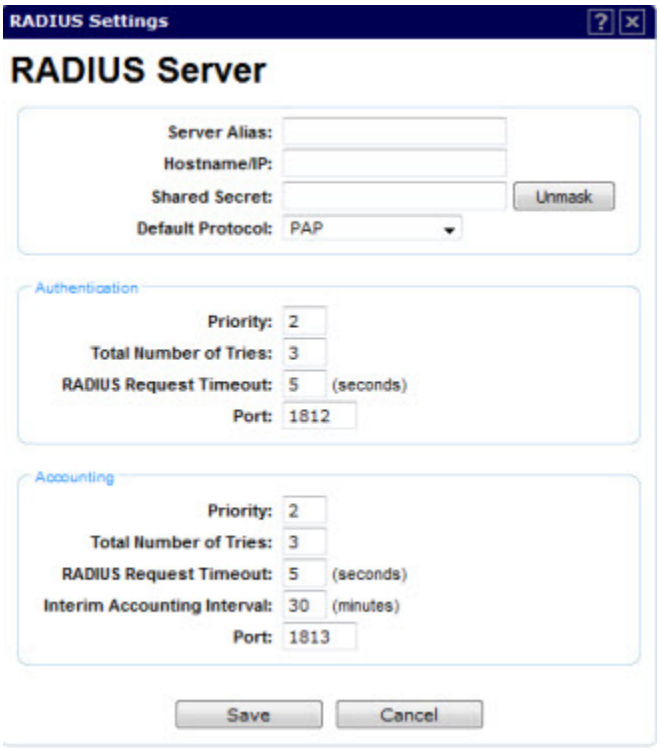
To Define RADIUS Servers for VNS Global Settings:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, click **Global**, then **Authentication**.

3. To enable changing RADIUS server settings per WLAN Service, select **Strict Mode**.



4. To define a new RADIUS server available on the network, click the **New** button. The **RADIUS Settings** pop up window displays.



5. In the **Server Alias** box, type a name that you want to assign to the RADIUS server.

Note:
You can also type the RADIUS server's IP address in the **Server Alias** box in place of a nickname. The RADIUS server will identify itself by the value typed in the **Server Alias** box in the **RADIUS Servers** drop down list on the **RADIUS Authentication** tab of the **Login Management** screen (**top menu** > **Wireless Controller** > **Login Management**). For more information, see "Configuring the Login Authentication Mode" on page 2-36.

6. In the **Hostname/IP** box, type either the RADIUS server's FQDN (fully qualified domain name) or IP address.

Note:
If you type the host name in the **Hostname/IP address** box, the SCALANCE IWLAN Controller will send a host name query to the DNS server for host name resolution. The DNS servers must be appropriately configured for resolving the RADIUS servers' host names. For more information, see "Configuring DNS Servers for Resolving Host Names of NTP and RADIUS Servers" on page 2-53.

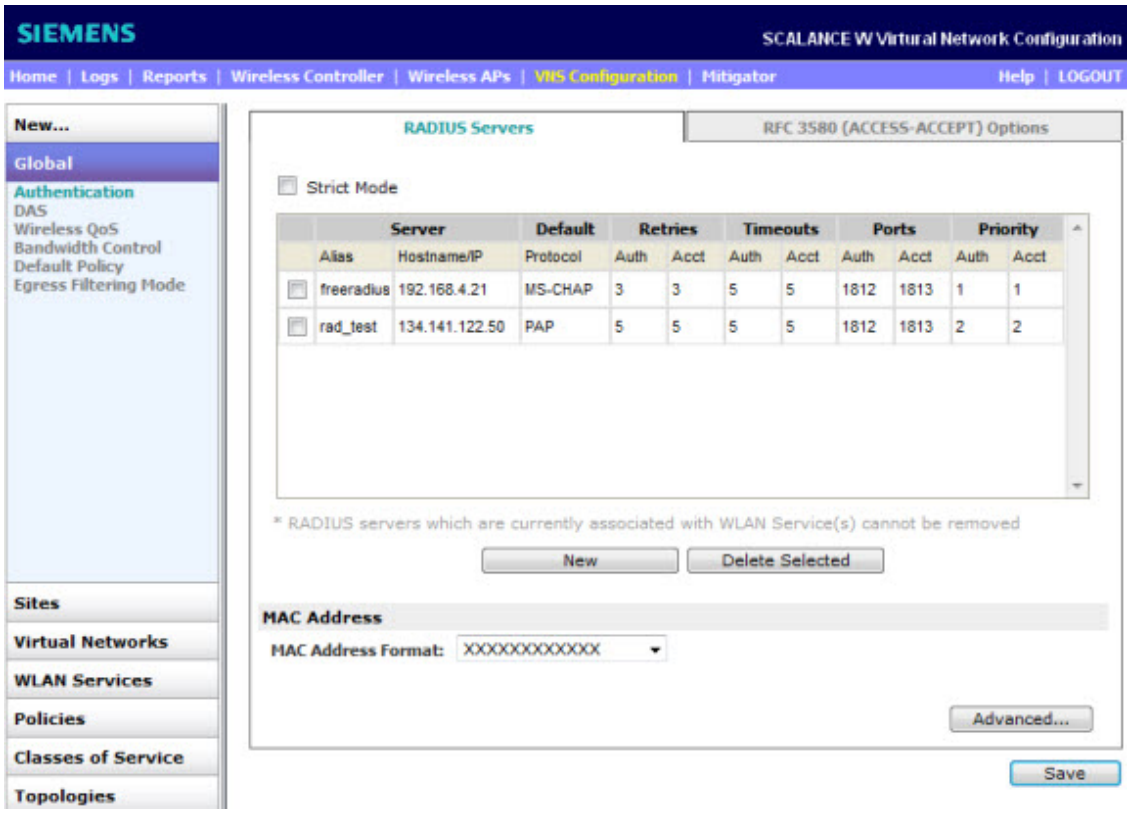
7. In the **Shared Secret** box, type the password that will be used to validate the connection between the SCALANCE IWLAN Controller and the RADIUS server.

   To proofread your shared secret key, click **Unmask**. The password is displayed.

Note:
You should always proofread your **Shared Secret** key to avoid any problems later when the SCALANCE IWLAN Controller attempts to communicate with the RADIUS server.

8. If desired, change the **Default Protocol** using the drop down list. Choices are PAP, CHAP, MS-CHAP, or MS-CHAP2.

9. If desired, change the pre-defined default values for **Authentication** and **Accounting** operations:
   a. Priority — default is 4
   b. Total number of tries — default is 3
   c. RADIUS Request timeout — default is 5 seconds
   d. Port — default Authentication port is 1812. Default Accounting port is 1813.
   e. For Accounting operations, the Interim Accounting Interval — default is 30 minutes.
10. To save your changes, click **Save**. The new server is displayed in the **RADIUS Servers** list.



Note:
The RADIUS server is identified by its **Server Alias**.

11. To edit an existing server, click the row containing the server. The RADIUS Settings window displays, containing the server's configuration values.
12. To remove a server from the list, select the checkbox next to the server, and then click **Delete Selected**. You cannot remove a server that is used by any VNS.

Configuring the Global MAC Address Format for Use with the RADIUS Servers

To Configure the Global MAC Address Format for Use with the RADIUS Servers:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, click **Global**, then **Authentication**.

3. In the **MAC Address** area, select the **MAC Address Format f**rom the drop down list.
4. Click **Save** to save your changes.

Including the SERVICE-TYPE Attribute in the Client ACCESS-REQUEST Messages

To Include the SERVICE-TYPE Attribute in the Client ACCESS-REQUEST Messages:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, click **Global**, then **Authentication**.
3. In the **MAC Address** area, click **Advanced**.
4. Select **Include Service-Type attribute in Client Access Request messages**.
5. Click **Close**.
6. Click **Save** to save your changes.

Changing the Display Time of the Notice Web Page

To Change How Long the Notice Web Page Displays If a Topology Change Occurs During Authentication:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, click **Global**, then **Authentication**.
3. In the **MAC Address** area, click **Advanced**.
4. In the **Delay for Client Message for Topology Change** field, specify how long, in seconds, the Web page is displayed to the client when the topology changes as a result of a policy change.

   The Web page indicates that authentication was successful and that the user must close all browser windows and then restart the browser for access to the network.

   Currently this is supported for Internal Captive Portal, Guest Portal, and Guest Splash.
5. Click **Close**.
6. Click **Save** to save your changes.

Configuring RADIUS Attribute for Hybrid Policy Mode

Hybrid Policy mode (RFC 3580 Mapping mode) enables the Wireless Controller to separately assign different policies or topologies depending on a mobile station location. There are three available modes of operation:

- **RADIUS Filter-ID attribute** — Controller uses the topology assigned by the policy and ignores the VLAN tunnel ID.
- **RADIUS Tunnel-Private-Group-ID attribute** — Controller selects a policy for the station based on the VLAN tunnel ID and ignores the filter ID. When selected, a mapping table maps each VLAN ID to a policy.

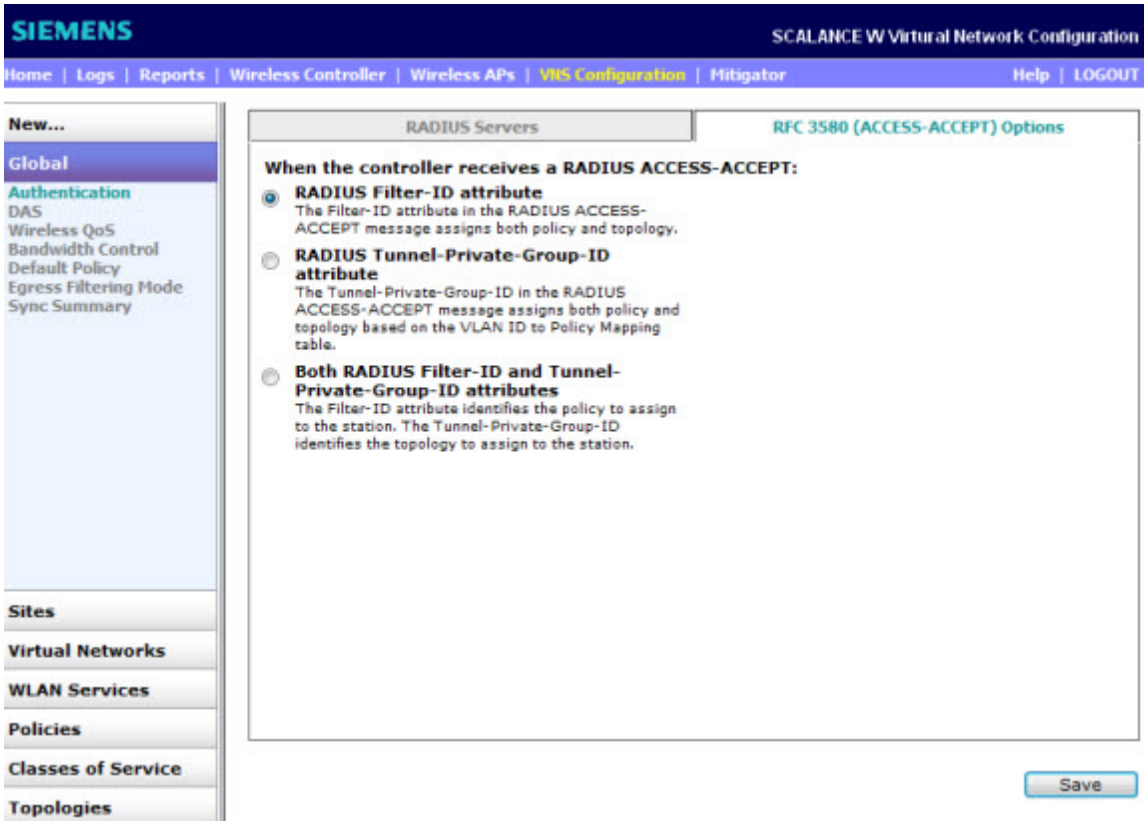
- **Both RADIUS Filter-ID and Tunnel-Private-Group-ID attribute** — Controller uses both the policy identified in the filter ID and the topology associated with the VLAN tunnel ID.

Note:
The selected mode of operation applies to all WLAN Services on the Wireless Controller.

Defining RFC 3580 Mapping Mode for VNS Global Settings

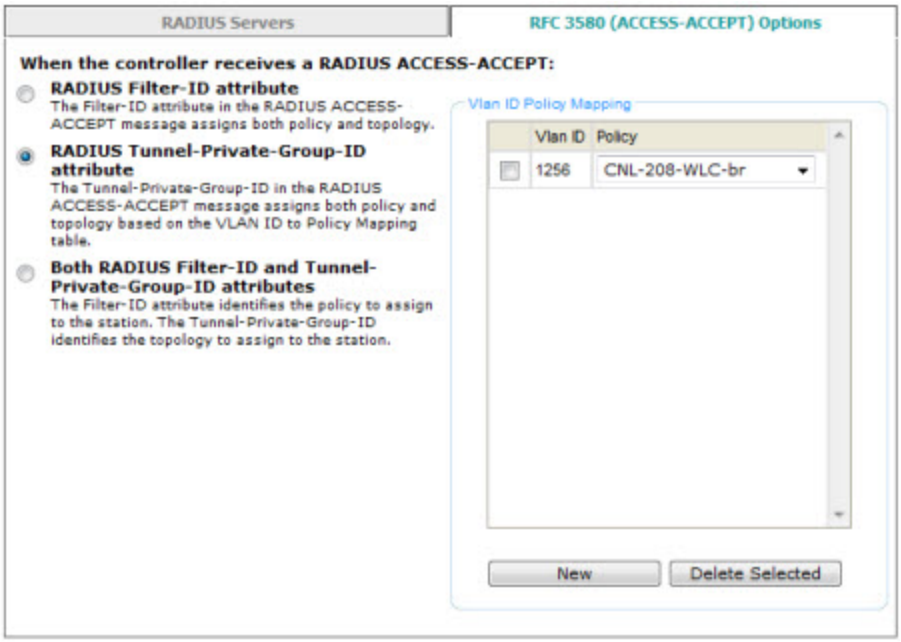
To Define RFC 3580 for VNS Global Settings:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, click **Global**, then **Authentication**.
3. Click the **RFC 3580 (ACCESS-ACCEPT) Options** tab.


SIEMENS
SCALANCE W Virtual Network Configuration
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
New...
Global
Authentication
DAS
Wireless QoS
Bandwidth Control
Default Policy
Egress Filtering Mode
Sync Summary
Sites
Virtual Networks
WLAN Services
Policies
Classes of Service
Topologies
RADIUS Servers
RFC 3580 (ACCESS-ACCEPT) Options
When the controller receives a RADIUS ACCESS-ACCEPT:
RADIUS Filter-ID attribute
The Filter-ID attribute in the RADIUS ACCESS-ACCEPT message assigns both policy and topology.
RADIUS Tunnel-Private-Group-ID attribute
The Tunnel-Private-Group-ID in the RADIUS ACCESS-ACCEPT message assigns both policy and topology based on the VLAN ID to Policy Mapping table.
Both RADIUS Filter-ID and Tunnel-Private-Group-ID attributes
The Filter-ID attribute identifies the policy to assign to the station. The Tunnel-Private-Group-ID identifies the topology to assign to the station.
Save

4. Select **RADIUS Filter - ID attribute** to assign both policy and topology when the controller receives a RADIUS ACCESS-ACCEPT message. To save your changes, click **Save**.

5. Select **RADIUS Tunnel-Private-Group-ID attribute** to assign both policy and topology (based on the VLAN ID to Policy Mapping table selection) when the controller receives a RADIUS ACCESS-ACCEPT message.


RADIUS Servers
RFC 3580 (ACCESS-ACCEPT) Options
When the controller receives a RADIUS ACCESS-ACCEPT:
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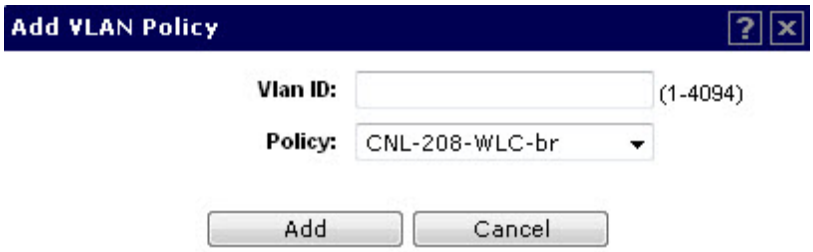
The Tunnel-Private-Group-ID in the RADIUS ACCESS-ACCEPT message assigns both policy and topology based on the VLAN ID to Policy Mapping table.
Both RADIUS Filter-ID and Tunnel-Private-Group-ID attributes
The Filter-ID attribute identifies the policy to assign to the station. The Tunnel-Private-Group-ID identifies the topology to assign to the station.
Vlan ID Policy Mapping
Vlan ID
Policy
1256
CNL-208-WLC-br
New
Delete Selected

   – In the VLAN ID Policy Mapping table, select an existing VLAN ID and Policy.

   – Click New to create a new mapping entry. In the Add VLAN Policy dialog, enter a VLAN ID, and select a Policy from the drop-down list.

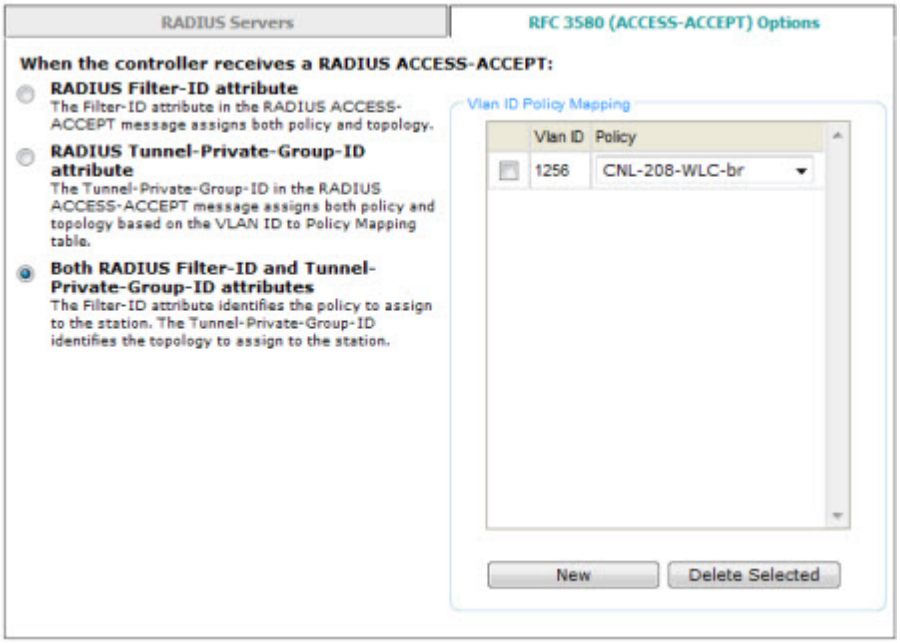


   – Click **Add**.

   – To save your changes, click **Save.**

6. Select **Both RADIUS Filter-ID and Tunnel-Private-Group-ID attribute**s to identify the policy to assign to the station and the topology to assign to the station (based on the VLAN ID to

Policy Mapping table selection), when the controller receives a RADIUS ACCESS-ACCEPT message.


RADIUS Servers
RFC 3580 (ACCESS-ACCEPT) Options
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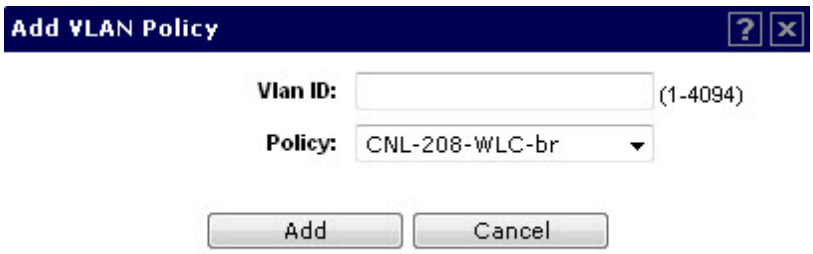
Vlan ID Policy Mapping
Vlan ID
Policy
1256
CNL-208-WLC-br
New
Delete Selected

- In the VLAN ID Policy Mapping table, select an existing VLAN ID and Policy.
- Click New to create a new mapping entry. In the Add VLAN Policy dialog, enter a VLAN ID, and select a Policy from the drop-down list.



- Click **Add**.
- To save your changes, click **Save.**

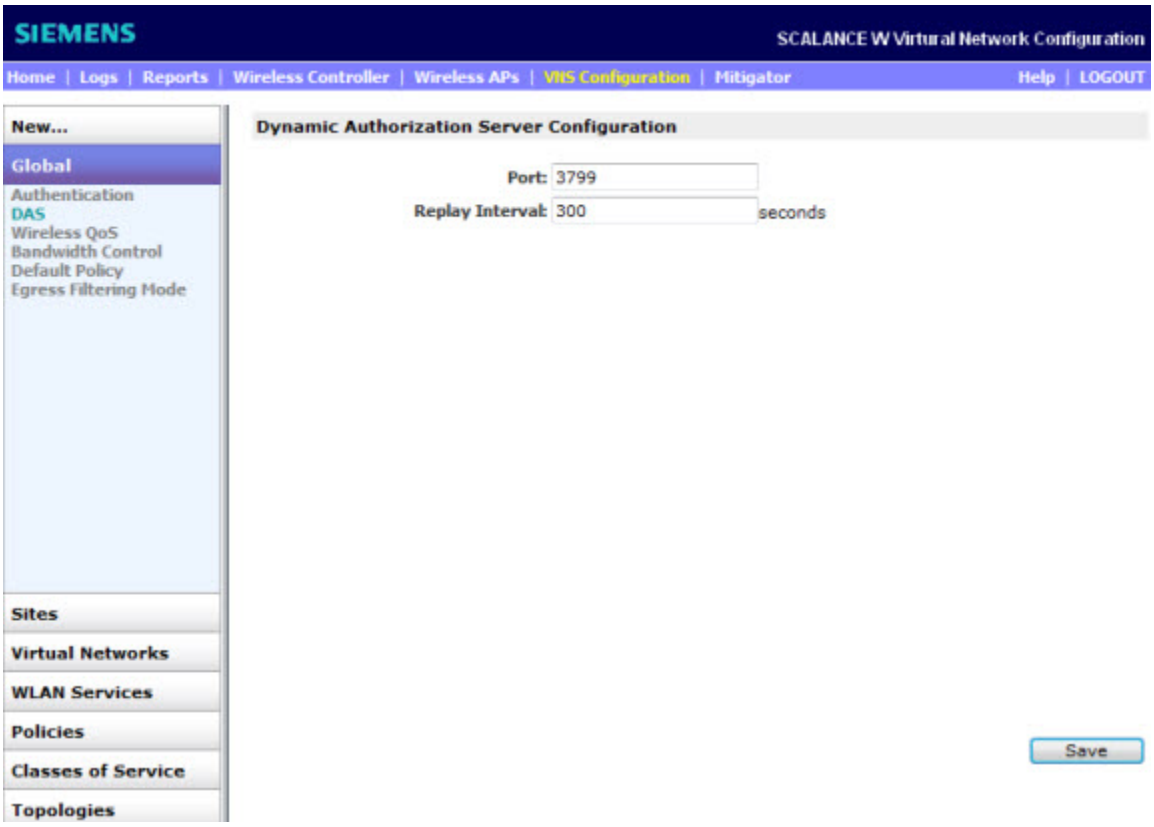
Configuring Dynamic Authorization Server Support

DAS helps secure your network by forcing the disconnection of any mobile device from your network. Typically, you would want to disconnect any unwelcome or unauthorized mobile device from your network. The “disconnect message” that is defined in RFC 3576 is enforced by the DAS support. If an unauthorized mobile device is detected on the network, the DAS client sends a disconnect packet, forcing the mobile device off the network. Your DAS client can be an integration with another third-party application, including RADIUS applications.

DAS support is available to all physical interfaces of the SCALANCE IWLAN Controller, and by default DAS listens to the standard-specified UDP port 3799.

To Configure Dynamic Authorization Server Support:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, click **Global,** then click **DAS.**



3. In the **Port** box, type the UDP port you want DAS to monitor. By default, DAS is configured for the standard-specified UDP port 3799. It is unlikely this port value needs to be revised.
4. In the **Replay Interval** box, type how long you want DAS to ignore repeated identical messages. By default, DAS is configured for 300 seconds.

   This time buffer helps defend against replay network attacks.
5. To save your changes, click **Save.**

Defining Wireless QoS Admission Control Thresholds

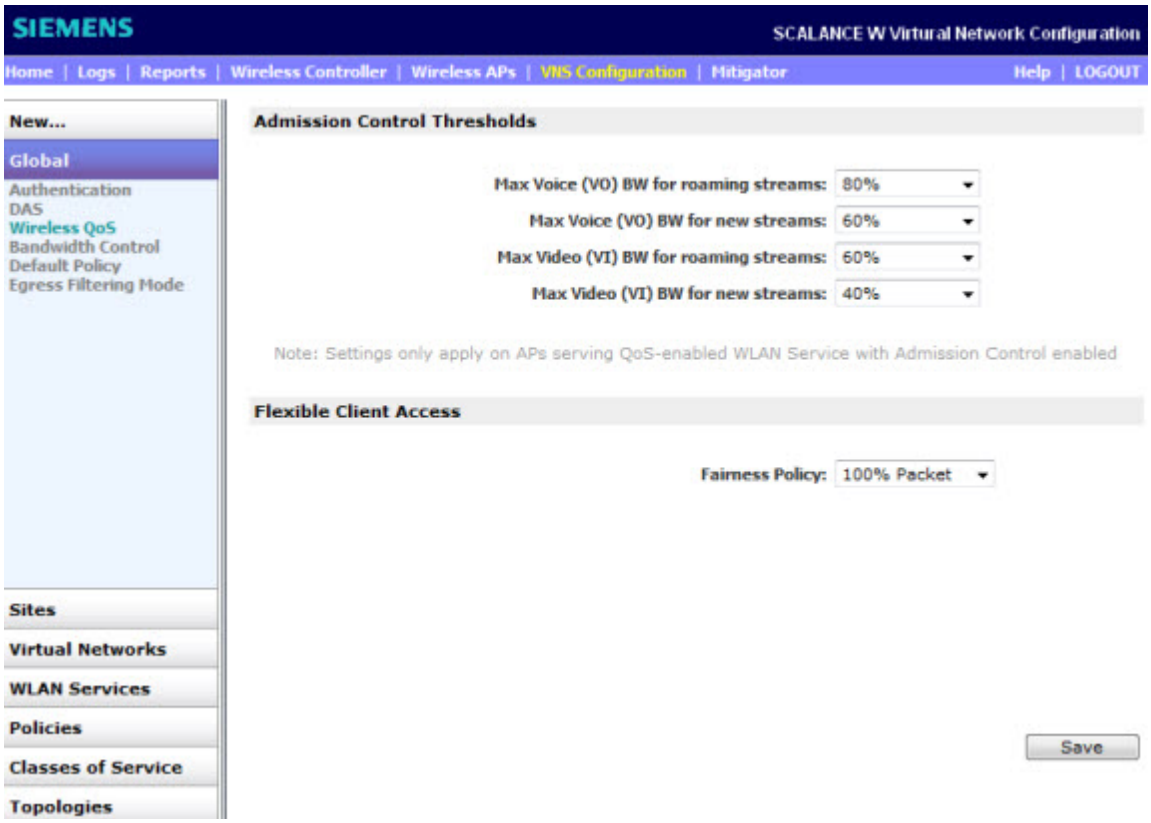
Defining the wireless QoS global settings include the following:

- Configuring QoS Admission Control Thresholds
- Configuring QoS Flexible Client Access

Configuring QoS Admission Control Thresholds

To Define Admission Control Thresholds for VNS Global Settings:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, click **Global,** then click **Wireless QoS**.



3. In the **Admission Control Thresholds** area, define the thresholds for the following:
   - **Max Voice (VO) BW for roaming streams** — The maximum allowed overall bandwidth on the new AP when a client with an active voice stream roams to a new AP and requests admission for the voice stream.
   - **Max Voice (VO) BW for new streams** — The maximum allowed overall bandwidth on an AP when an already associated client requests admission for a new voice stream.
   - **Max Video (VI) BW for roaming streams** — The maximum allowed overall bandwidth on the new AP when a client with an active video stream roams to a new AP and requests admission for the video stream.
   - **Max Video (VI) BW for new streams** — The maximum allowed overall bandwidth on an AP when an already associated client requests admission for a new video stream.

   These global QoS settings apply to all APs that serve QoS enabled VNSs with admission control.
4. To save your changes, click **Save**.

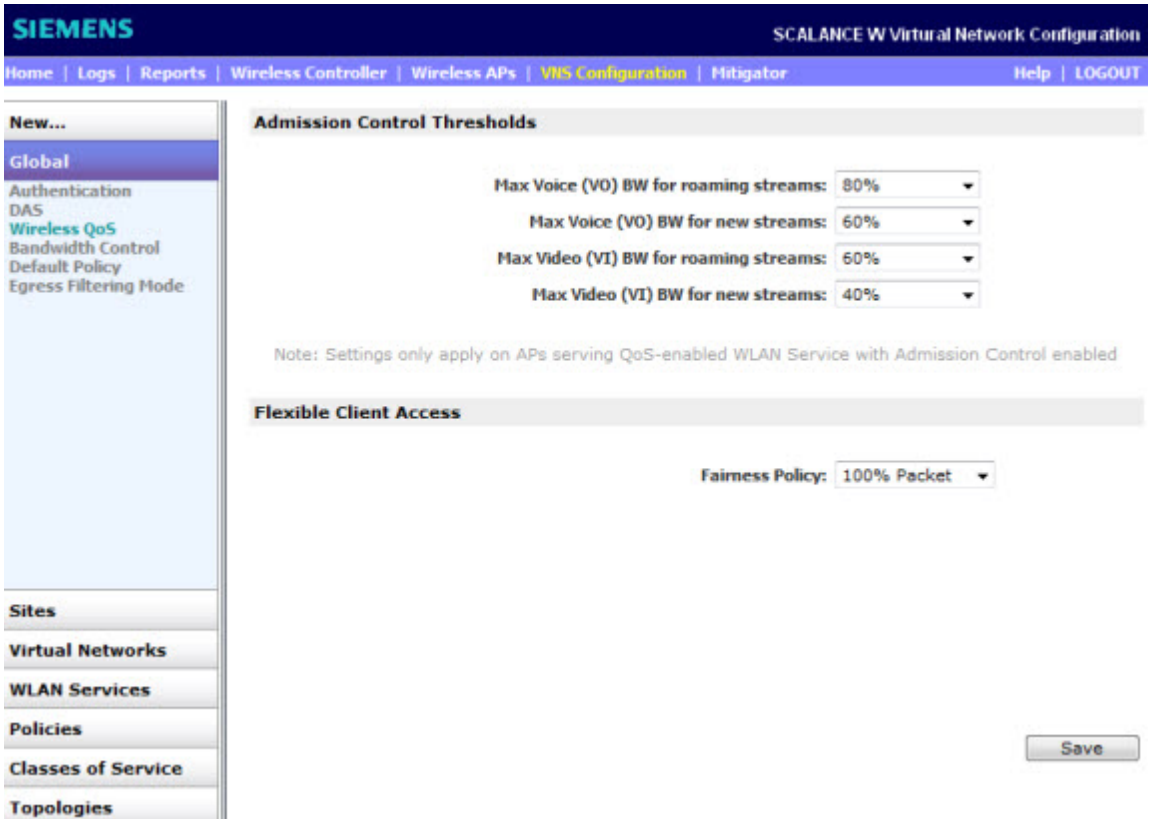
Configuring QoS Flexible Client Access

This feature allows you to adjust client access policy in multiple steps between “packet fairness” and “airtime fairness.”

- Packet fairness is the default 802.11 access policy. Each WLAN participant gets the same (equal) opportunity to send packets. All WLAN clients will show the same throughput, regardless of their PHY rate.
- Airtime fairness gives each WLAN participant the same (equal) time access. WLAN clients’ throughput will be proportional to their PHY rate.

To Define Flexible Client Access for VNS Global Settings:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, click **Global,** then click **Wireless QoS**.



3. In the **Flexible Client Access** area, select a policy from the **Fairness Policy** drop-down list. Choices range from 100% packet fairness to 100% airtime fairness.

Note:
TSPEC must be disabled when using Flexible Client Access.

4. To save your changes, click **Save**.

Working with Bandwidth Control Profiles

Bandwidth control limits the amount of bidirectional traffic from a mobile device. A bandwidth control profile provides a generic definition for the limit applied to certain wireless clients' traffic. A bandwidth control profile is assigned on a per policy basis. A bandwidth control profile is not applied to multicast traffic.

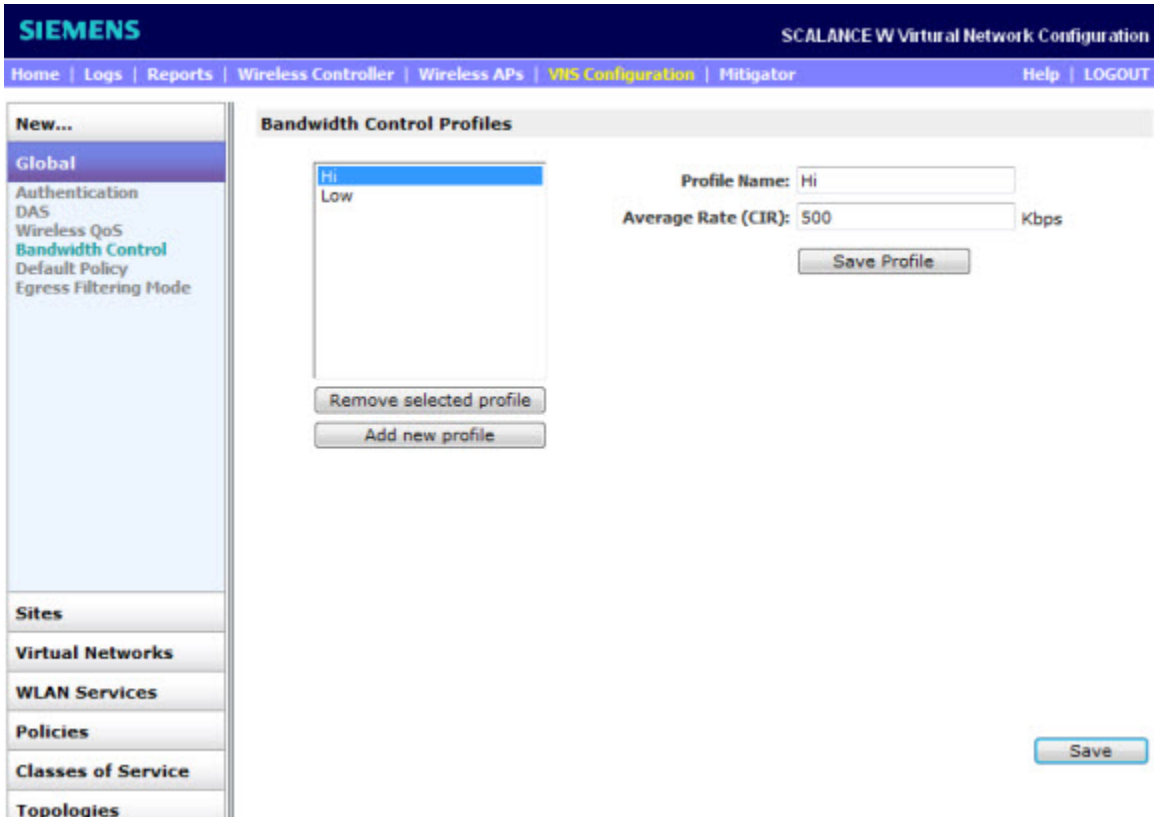
A bandwidth control profile consists of the following parameters:

- **Profile Name** — Name assigned to a profile
- **Committed Information Rate (CIR)** — Rate at which the network supports data transfer under normal operations. It is measured in kilo bytes per second (Kbps).

The bandwidth control profiles you define on the VNS **Global Settings** screen are displayed as available choices in the **Bandwidth Control Profiles** list on the **Classes of Service** screen.

To Create a Bandwidth Control Profile:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, click **Global,** then click **Bandwidth Control.**



3. Create a bandwidth control profile by doing the following:
   - **Profile Name** — Type a name for the bandwidth control profile.
   - In the **Average Rate (CIR)** — Type the CIR value for the bandwidth control profile.
4. Click **Add Profile**. The profile is created and displayed in the **Bandwidth Control Profiles** list.
5. Create additional bandwidth control profiles, if applicable.

6. To save your changes, click **Save.**

Configuring the Global Default Policy

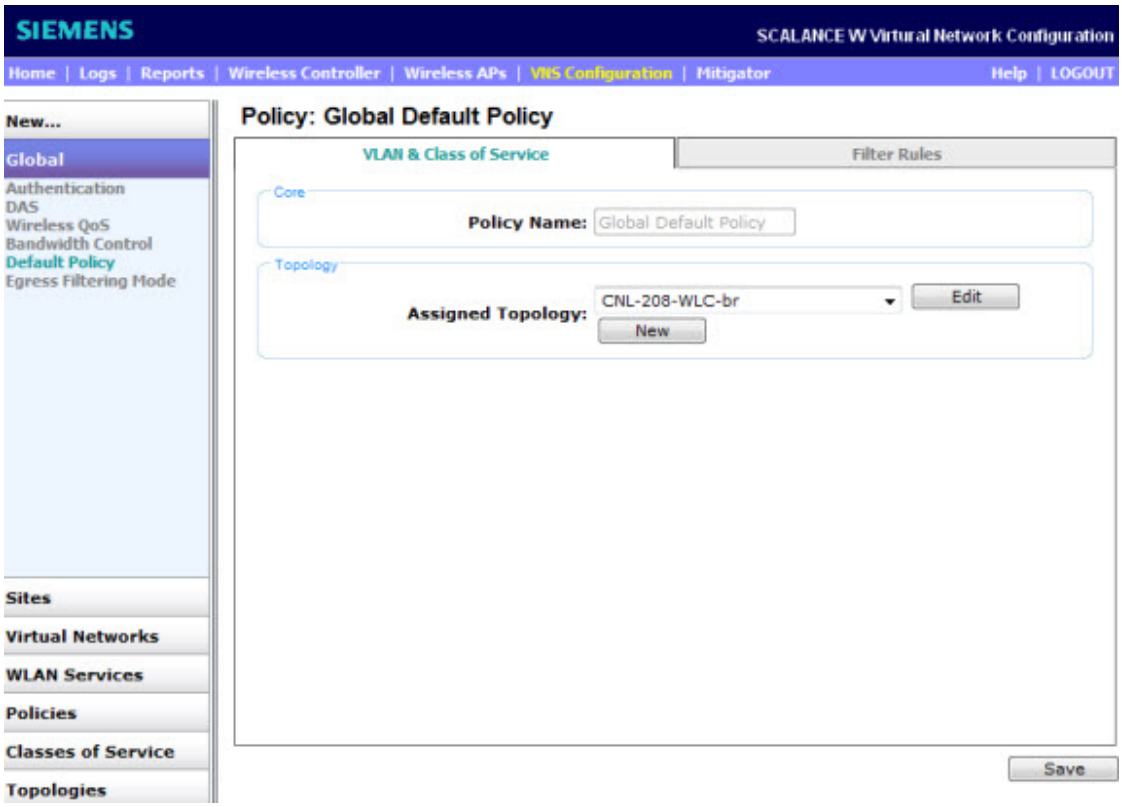
The SCALANCE IWLAN Controller ships with a Global Default Policy that can be configured. The Global Default Policy specifies:

- A topology to use when a VNS is created using a policy that does not specify a topology. The default assigned topology is named Bridged at AP untagged.
- A set of filters

Configuring the Topology and Rate Profiles

To Configure the Topology and Rate Profiles:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, click **Global,** then click **Default Policy.**
3. Select the **VLAN & Class of Service** tab.



4. In the **Topology** area, select a topology using one of the following methods:
   - Select an existing topology from the **Assigned Topology** drop-down list.
   - Select an existing topology from the **Assigned Topology** drop-down list, then click **Edit**. The **Edit Topology** window displays, showing the current values for the selected topology.

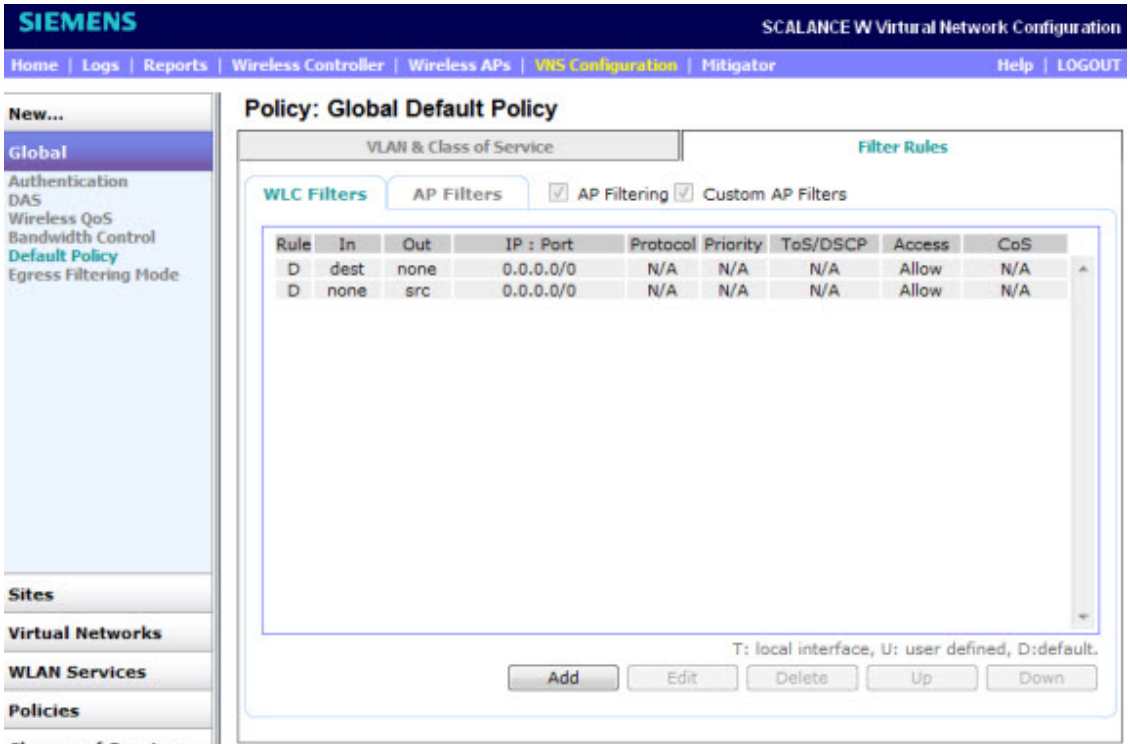
– Click the **New** button. The **New Topology** window displays.

Edit or create the selected topology as described in "Configuring a Basic Data Port Topology" on page 4-4.

Configuring the Filters

To Configure the Filters:

1. Click the **Filter Rules** tab. The **WLC Filters** tab displays, allowing you to create filter rules that will be applied by the controller when default non-authentication policy does not specify filters.



2. To add a rule, click **Add**. The fields in the Add Filter area are enabled.
3. Configure the fields as desired. For more information, see "Filtering Rules" on page 5-3.
4. To configure custom AP filters, select the **AP Filtering** checkbox, then select the **Custom AP Filters** checkbox and click the **AP Filters** tab. Then configure the rules as desired.

   For more information, see "Defining Filter Rules for Wireless APs" on page 5-7.

Configuring Egress Filtering Mode

The SCALANCE IWLAN Controller can be configured to support Policy Manager's Egress Policy mode. Egress Policy refers to taking the ingress filters assigned to a port, exchanging the source and destination addresses with each other in each policy rule and applying the result to the traffic egressing the port.

SCALANCE WLC711 applies egress filtering mode to WLAN services. When egress filtering is enabled, any policy that is applied to a station on the WLAN service will have its outbound filters

replaced with rules in which the source and destination addresses of the inbound filters are swapped.

The same policy can be assigned to stations on WLAN services that have egress filtering mode enabled and on WLAN services that have it disabled.

- For stations that are on WLAN services with egress filtering mode enabled, the policies outbound filters will be replaced by ones derived from the inbound filter rules.
- For stations that are on WLAN services with egress filtering disabled, the outbound filters of the policy will be applied as defined. In other words the same policy can be applied in two different ways at the same time, based on the egress filter mode settings of the WLAN services it is used with.

The global egress filtering mode setting overrides the individual WLAN service egress filter mode setting. By default the global egress filtering mode is set to Use WLAN setting. In this mode, egress filtering can be enabled for some WLAN services and not others, by using the Egress Filtering Mode setting available in each WLAN service's Advanced configuration dialog.

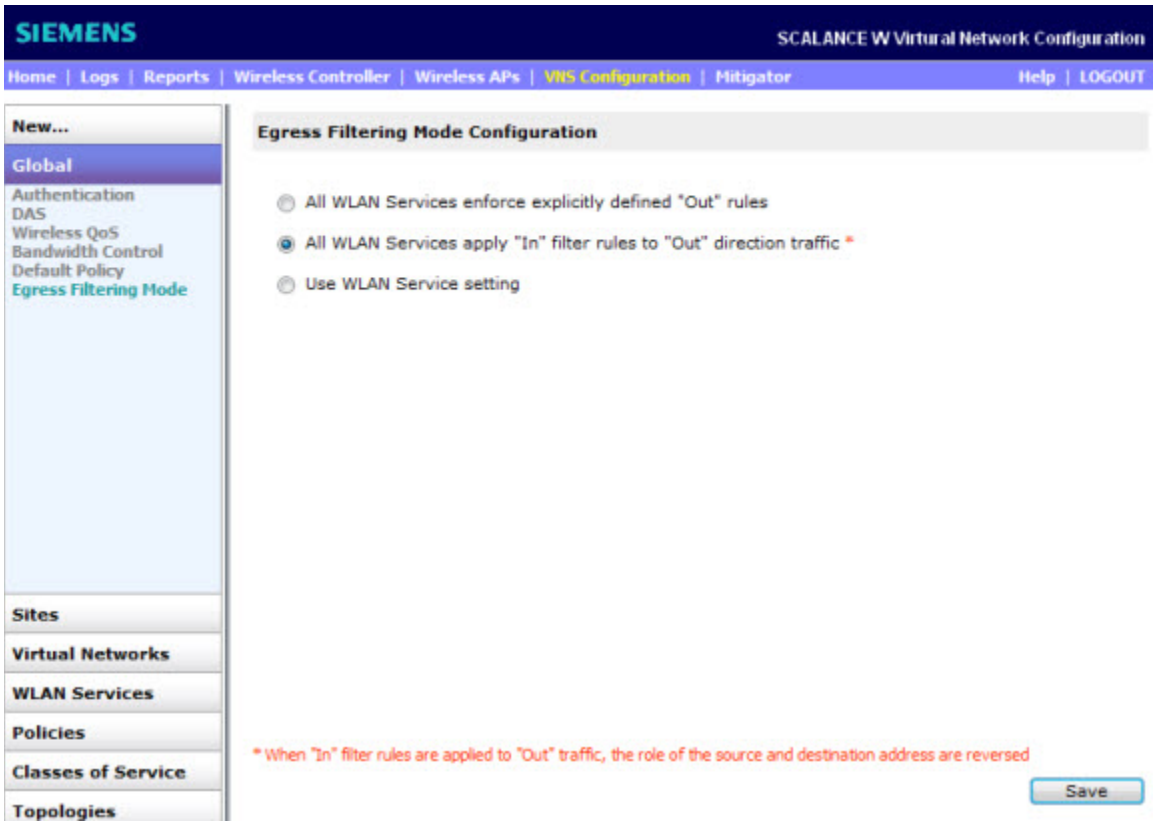
Changing the global egress filtering mode doesn't alter each individual WLAN service's own egress filtering mode setting, although it can override them. Changing the global egress filtering mode doesn't alter the outbound filter rules of each policy. Each policy's filter rules are stored on the controller as they were entered. Changing the global egress filtering mode flag will affect how a policy's filter rules are interpreted when they are applied.

Configuring the In/Out Rules for WLAN Services Settings

To Configure the Egress Filtering Mode:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.

2. In the left pane, click **Global**, then **Egress Filtering Mode.** The **Egress Filtering Mode Configuration** screen displays.


SIEMENS
SCALANCE W Virtual Network Configuration
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
New...
Global
Authentication
DAS
Wireless QoS
Bandwidth Control
Default Policy
Egress Filtering Mode
Sites
Virtual Networks
WLAN Services
Policies
Classes of Service
Topologies
Egress Filtering Mode Configuration
All WLAN Services enforce explicitly defined "Out" rules
All WLAN Services apply "In" filter rules to "Out" direction traffic *
Use WLAN Service setting
* When "In" filter rules are applied to "Out" traffic, the role of the source and destination address are reversed
Save

3. In the Egress Filtering Mode Configuration area select an egress filtering mode:
   - When egress filtering mode is set to **All WLAN Services enforce explicitly defined "Out" rules**, all WLAN services will enforce outbound filters on egress traffic, exactly as they are defined in the policy.
   - When egress filtering mode is set to **All WLAN Services apply "In" filter rules to "Out" direction traffic**, all WLAN services will enforce that any outbound filter rules explicitly defined in the policy are overridden by a set of rules created by copying each inbound filter rule and swapping the source and destination address roles in the rule.
   - When egress filtering mode is set to **Use WLAN Service setting**, each policy's filter rules will be interpreted in accordance with the **Egress Filtering Mode** setting of each WLAN Service on which the policy is applied. In this mode, it is possible that a policy's filter rules can be interpreted in two different ways at the same time, if it is used simultaneously on a WLAN service that has **Enforce explicitly defined "Out" rules** enabled and on a WLAN service that has **Apply "In" rules to "Out" direction traffic** at the same time.

Using the Sync Summary

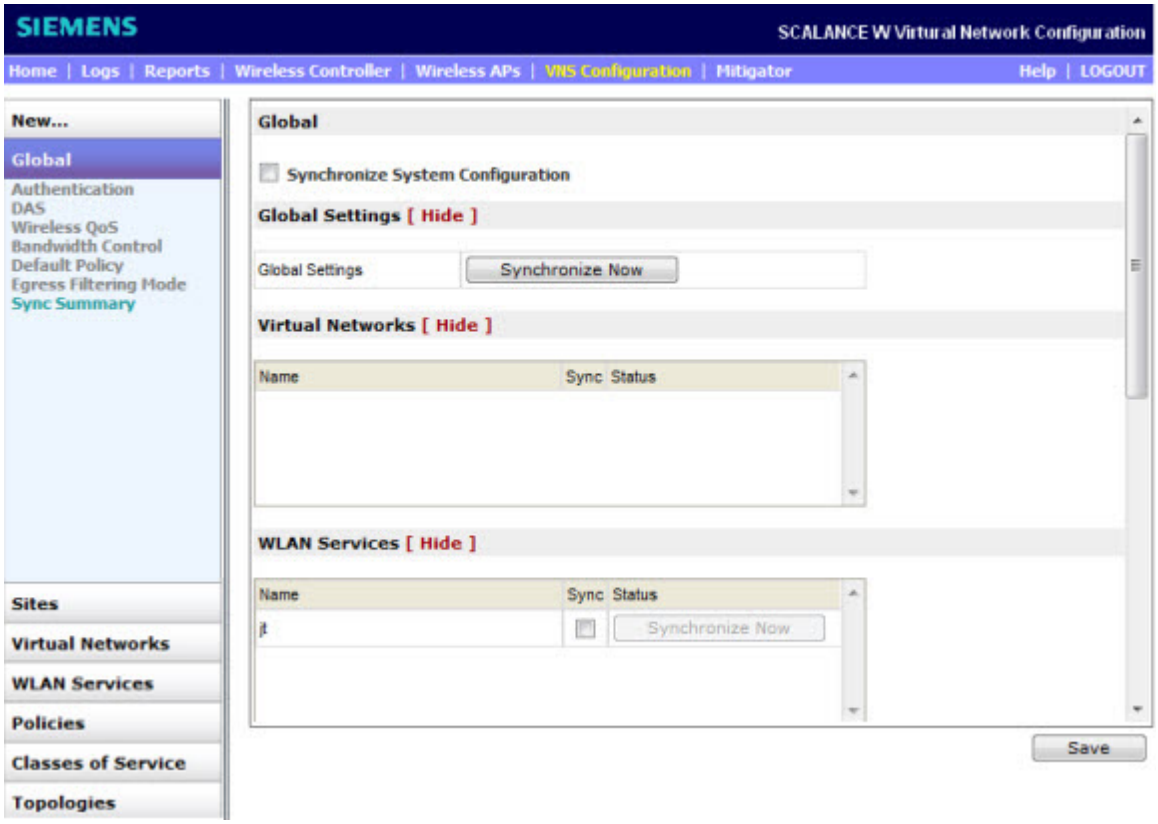
The Sync Summary screen provides an overview of the synchronization status of paired controllers. The screen is divided into five sections: Virtual Networks, WLAN services, Policies, Classes of Service, and Topologies. Each section lists the name of the corresponding configuration object, its synchronization mode, and the status of last synchronization attempt.

If Synchronization of an object is not enabled, then there is a button in the Status field which says “Synchronize Now”, which performs a single synchronization of the object, pushing the object from local controller to the peer.

If Synchronization of an object is enabled, then the “Status” field can have the following values:

- Synchronized
- Not Synchronized
- Failed
- Conflict (with a button called “Resolve”)

The checkbox “Synchronize System Configuration” acts as a global synchronization flag. When it's disabled, synchronization is not performed in the background. When it is enabled, only the objects that have “Sync” enabled are synchronized.



An object may have a synchronization state of “Conflict” if it was updated on both controllers in the availability pair while the availability link was down. In such a case, the “Resolve” button lets you choose which version of the object should be taken, local or remote. Please note that controllers don't compare the actual configuration when they declare a conflict — only the fact that the object was updated on both controllers in the availability pair triggers the “Conflict” state.

Methods for Configuring a VNS

To configure a VNS, you can use one of the following methods:

- **Manual configuration** — Allows you to create a new VNS by first configuring the topology, policy, and WLAN services and then configuring any remaining individual VNS tabs that are necessary to complete the process.

  When configuring a VNS, you can navigate between the various VNS tabs and define your configuration without having to save your changes on each individual tab. After your VNS configuration is complete, click **Save** on any VNS tab to save your completed VNS configuration.

Note:
If you navigate away from the VNS configuration tabs without saving your VNS changes, your VNS configuration changes will be lost.

- **Wizard configuration** — The VNS wizard helps create and configure a new VNS by prompting you for a minimum amount of configuration information. The VNS is created using minimum parameters. The remaining parameters are automatically assigned in accordance with best practice standards.

  After the VNS wizard completes the VNS creation process, you can then edit or revise any of the VNS configuration to suit your network needs.

Manually Creating a VNS

Advanced configuration allows administrators to create a new VNS once the topology, policy, and WLAN services required by the VNS parameters are available. The topology, policy and WLAN services could be created in advance or could be created at the time of VNS configuration.

When you create a new VNS, additional tabs are displayed depending on the selections made in the Core box of the main VNS configuration tab.

When configuring a VNS, you can navigate between the various VNS tabs and define your configuration without having to save your changes on each individual tab. After your VNS configuration is complete, click **Save** on any VNS tab to save your complete VNS configuration.

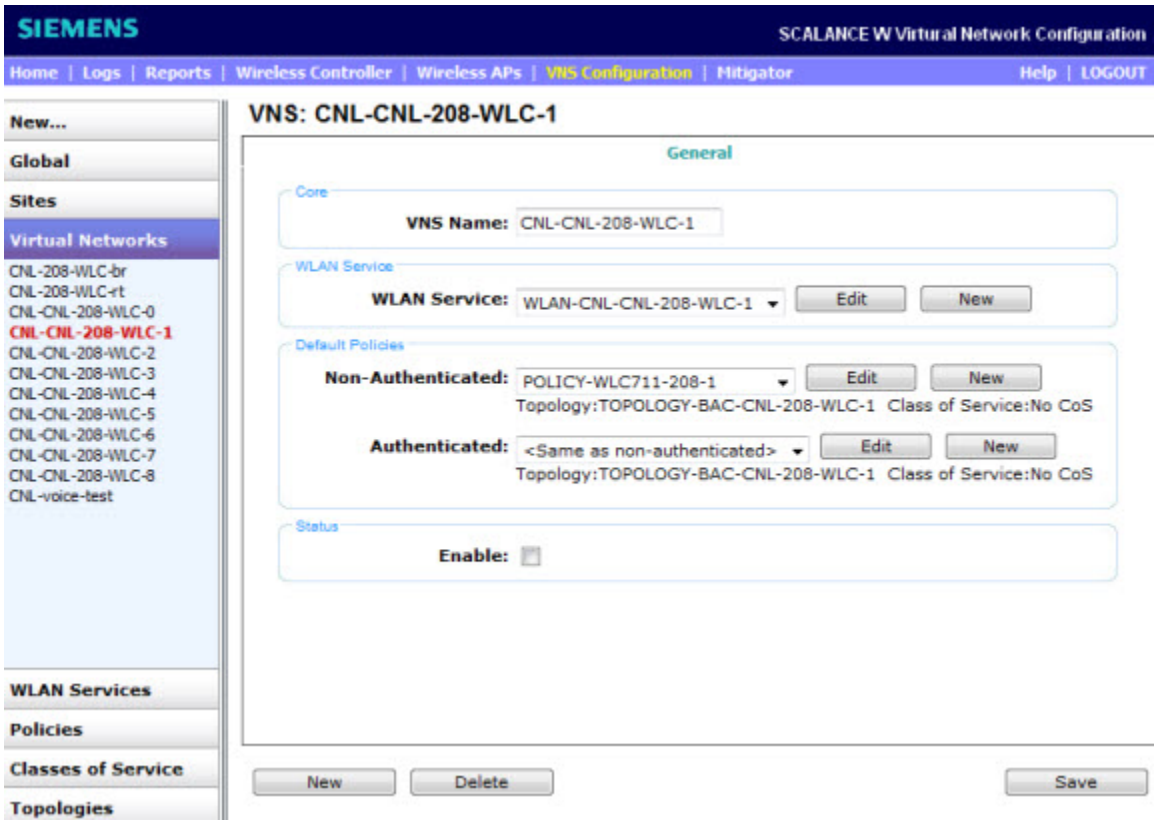
Note:
If you navigate away from the VNS Configuration tabs without saving your VNS changes, your VNS configuration changes will be lost.

The following procedure lists the steps necessary to create a VNS in advanced mode. Each step references a section in this document that describes the full details. Follow the links provided to go directly to the appropriate sections.

To Create a VNS Manually:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.

2. In the left pane, expand the **Virtual Networks** pane and select an existing VNS to edit, or click the **New** button.



3. Enter a name for the VNS.
4. Select an existing WLAN Service for the VNS, or create a new WLAN Service, or edit an existing one.

   For more information, see "Configuring a Basic WLAN Service" on page 6-2.
5. Configure the Default Policies for the VNS. Select existing policies, or create new policies, or edit existing ones.

   For more information, see:

   – "Configuring Policies" on page 5-1.
   – "Configuring Topologies" on page 4-1.
6. Configure the Status parameters for the VNS:

   – **Synchronize** — Enable automatic synchronization with its availability peer. Refer to "Using the Sync Summary" on page 7-19 for information about viewing synchronization status. If this VNS is part of an availability pair, Siemens recommends that you enable this feature.
   – **Restrict Policy Set** — This feature provides backward compatibility for legacy VNSs that were upgraded from software releases prior to V7.0. When it is enabled, the controller respects the prior hierarchical view of parent/child VNSs and maps external references to properly named (that is, hierarchically named) Policies.
   – **Enabled** — Check to enable the VNS.

7. Click **Save** to save your changes.

Also, as with creating a new VNS, you can:

- Configure a topology for the VNS
- Configure a policy for the VNS
- Configure WLAN services for the VNS
- Configure additional policies for the VNS

Creating a VNS Using the Wizard

The VNS wizard helps create and configure a new VNS by prompting you for a minimum amount of configuration information during the sequential configuration process. After the VNS wizard completes the VNS creation process, you can then continue to configure or revise any of the VNS configuration to suit your network needs.

When using the VNS wizard to create a new VNS, you can create the following types of VNSs:

- **Voice** — Voice-specific VNS that can support various wireless telephones, including optiPoint, Spectralink, Vocera, and Mobile Connect - Nokia. For more information, see "Creating a Voice VNS Using the VNS Wizard" on page 7-23.
- **Data** — Data-specific VNS, that can be configured to use either SSID or AAA authentication. For more information, see "Creating a Data VNS Using the VNS Wizard" on page 7-32.
- **Captive Portal** — A VNS that employs a Captive Portal page, which requires mobile users to provide login credentials when prompted to access network services. In addition, use the VNS wizard to configure a GuestPortal VNS using the Captive Portal option. For more information, see "Creating a Captive Portal VNS Using the VNS Wizard" on page 7-41.
- **Other** — Use this VNS wizard option to create a VNS as you would if you were creating a new VNS using the advanced configuration method. For more information, see "Enabling and Disabling a VNS" on page 7-70.

The VNS type dictates the configuration information that is required during the VNS creation process.

Creating a Voice VNS Using the VNS Wizard

Use the VNS wizard to create a voice-specific VNS that can support various wireless telephones, including optiPoint, Spectralink, Vocera, and Mobile Connect - Nokia.

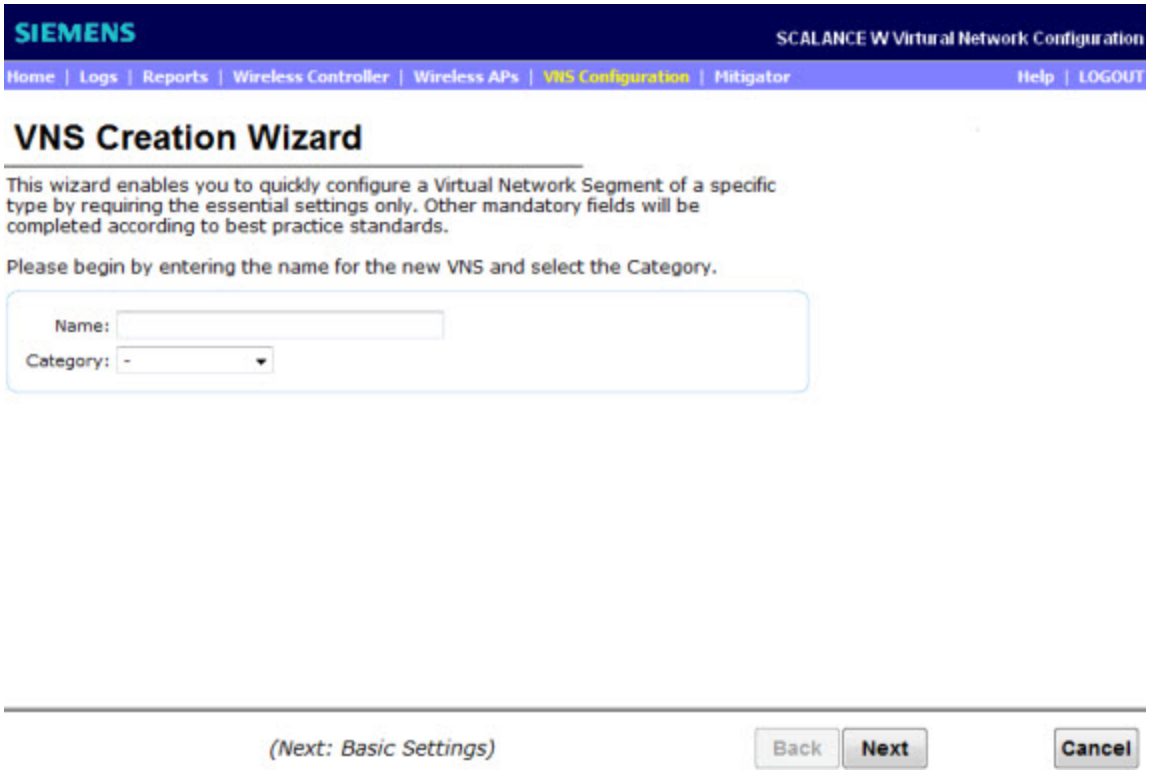
When you use the VNS wizard to create a voice-specific VNS, you optimize the voice VNS to support one wireless telephone vendor. If the voice VNS needs to be optimized for more than one wireless phone vendor, use the advanced method to create the voice-specific VNS. For more information, see "Enabling and Disabling a VNS" on page 7-70.

When you create a new voice VNS using the VNS wizard, you configure the VNS in the following stages:

- Basic settings
- Authentication settings, if applicable
- DHCP settings
- Privacy settings
- Radio assignment settings
- Summary

To Configure a Voice VNS Using the VNS Wizard:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, expand the New pane, then click **START VNS WIZARD**. The **VNS Creation Wizard** screen is displayed.
3. Click **Start VNS Wizard**. The **VNS Creation Wizard** screen is displayed.


SIEMENS
SCALANCE W Virtual Network Configuration
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
VNS Creation Wizard
This wizard enables you to quickly configure a Virtual Network Segment of a specific type by requiring the essential settings only. Other mandatory fields will be completed according to best practice standards.
Please begin by entering the name for the new VNS and select the Category.
Name:
Category: -
(Next: Basic Settings)
Back
Next
Cancel

4. In the **Name** box, type a name for the voice VNS.

5. In the **Category** drop-down list, click **Voice**, and then click **Next**. The **Basic Settings** screen is displayed.

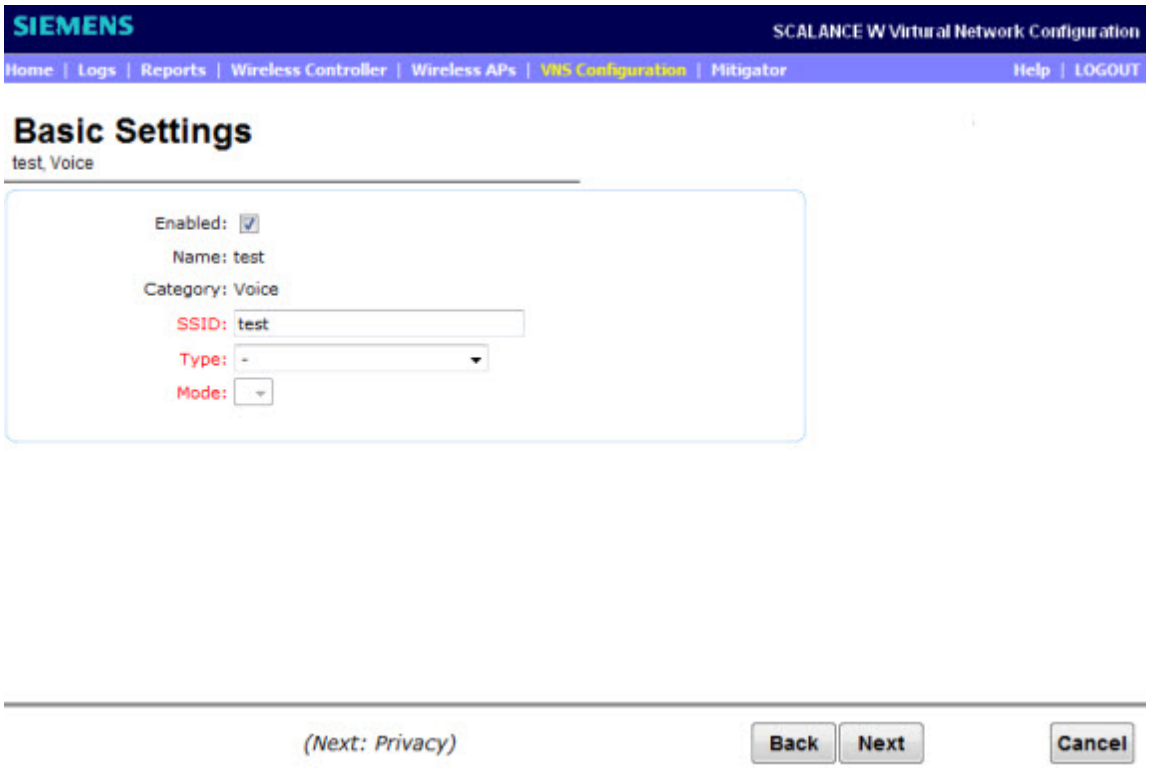


Table 7-1 Voice VNS Basic Settings Page - Fields and Buttons

Field/Button	Description
Enabled	By default, the **Enabled** checkbox for the new VNS is enabled. A VNS must be enabled for it to be able to provide service for mobile user traffic.
Synchronize	By default, the **Synchronize** checkbox for the new VNS is disabled.
Name	Identifies the name of the VNS.
Category	Identifies the VNS category.
SSID	Identifies the SSID assigned to the VNS.
Type	Click the wireless phone you want to support for the new voice VNS you are creating.

Table 7-1 Voice VNS Basic Settings Page - Fields and Buttons (continued)

Field/Button	Description
Mode	Click the VNS Mode you want to assign: **Routed** is a VNS type where user traffic is tunneled to the SCALANCE IWLAN Controller. **Bridge Traffic Locally at WLC** is a VNS type that has associated with it a Topology with a mode of Bridge Traffic Locally at WLC. User traffic is tunneled to the SCALANCE IWLAN Controller and is directly bridged at the controller to a specific VLAN. With this VNS type, mobile users become a natural extension of a VLAN subnet. For each Bridge Traffic Locally at WLC VNS that is created, a VLAN needs to be specified. In addition, the network port on which the VLAN is assigned must be configured on the switch, and the corresponding SCALANCE IWLAN Controller interface must match the correct VLAN.
Routed Voice VNS	
Gateway	Type the SCALANCE IWLAN Controller's own IP address of the topology associated with that VNS. This IP address is also the default gateway for the VNS. The SCALANCE IWLAN Controller advertises this address to the wireless devices when they sign on. For routed VNSs, it corresponds to the IP address that is communicated to mobile users (in the VNS) as the default gateway for the VNS subnet. (Mobile users target the SCALANCE IWLAN Controller's interface in their effort to route packets to an external host).
Mask	Type the appropriate subnet mask for this IP address to separate the network portion from the host portion of the address (typically 255.255.255.0).
Gateway/SVP	If the voice VNS is to support Spectralink wireless phones, type the IP address of the SpectraLink Voice Protocol (SVP) gateway.
Vocera Server	If the voice VNS is to support Vocera wireless phones, type the IP address of the Vocera server.
PBX	If the voice VNS is to support either WL2 or Mobile Connect - Nokia wireless phones, type the PBX IP address.
Enable Authentication	If applicable, select this checkbox to enable authentication for the new voice VNS.
Enable DHCP	By default, this option is selected.
Bridge Traffic Locally- Voice VNS	
Interface	Click the physical interface that provides the access to the VLAN.
Interface IP address	Type the IP address of the SCALANCE IWLAN Controller’s interface on the VLAN.
Mask	Type the appropriate subnet mask for this IP address to separate the network portion from the host portion of the address (typically 255.255.255.0).
VLAN ID	Type the VLAN tag to which the SCALANCE IWLAN Controller will be bridged for the VNS.

Table 7-1 Voice VNS Basic Settings Page - Fields and Buttons (continued)

Field/Button	Description
Gateway/SVP	If the voice VNS is to support Spectralink wireless phones, type the IP address of the SpectraLink Voice Protocol (SVP) gateway.
Vocera Server	If the voice VNS is to support Vocera wireless phones, type the IP address of the Vocera server.
PBX Server	If the voice VNS is to support either WL2 or Mobile Connect - Nokia wireless phones, type the PBX IP address.
Enable Authentication	If applicable, select this checkbox to enable authentication for the new voice VNS.
Enable DHCP	If applicable, select this checkbox to enable DHCP authentication for the new voice VNS.

6. Click **Next**.

   If the **Enable Authentication** checkbox is selected, you now must configure the Authentication properties of the new voice VNS. Continue with Step 7.

   If the **Enable Authentication** checkbox is clear, you must now configure the DHCP properties of the new voice VNS. Continue with Step 8.

7. The Authentication screen is displayed.

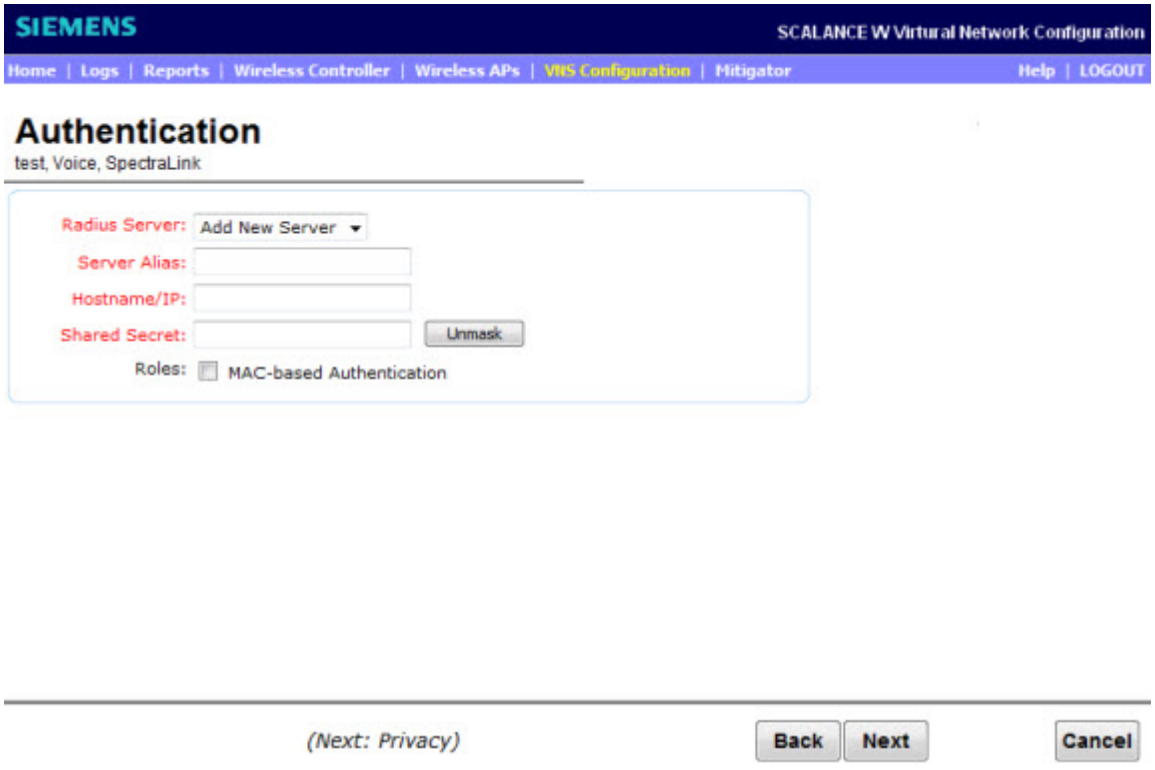


Table 7-2 Voice VNS Authorization Page - Fields and Buttons

Field/Button	Description
Radius Server	Click the RADIUS server you want to assign to the new voice VNS, or click **Add New Server** and then do the following

Table 7-2 Voice VNS Authorization Page - Fields and Buttons (continued)

Field/Button	Description
Server Alias	Type a name you want to assign to the new RADIUS server.
Hostname/IP	Type either the RADIUS server's FQDN (fully qualified domain name) or IP address.
Shared Secret	Type the password that will be used to validate the connection between the SCALANCE IWLAN Controller and the RADIUS server.
Mask/Unmask	Click to display or hide your shared secret key.
Roles	Select the authentication role options for the RADIUS server: **MAC-based Authentication** — Select to enable the RADIUS server to perform MAC-based authentication on the voice VNS. If applicable, and the **MAC-based authentication** option is enabled, select to enable **MAC-based authorization on roam**.
Radius Server	Click the RADIUS server you want to assign to the new data VNS, or click **Add New Server** and then do the following
Server Alias	Type a name you want to assign to the new RADIUS server.

8. The **DHCP** screen is displayed.

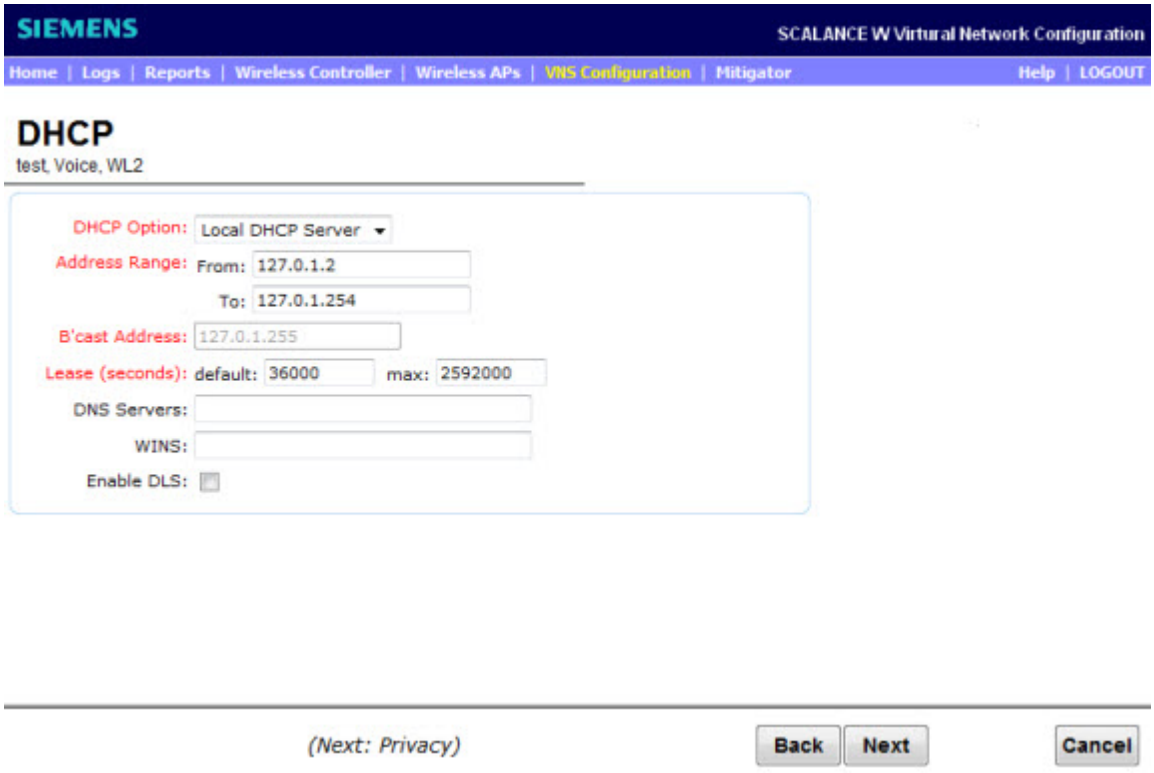
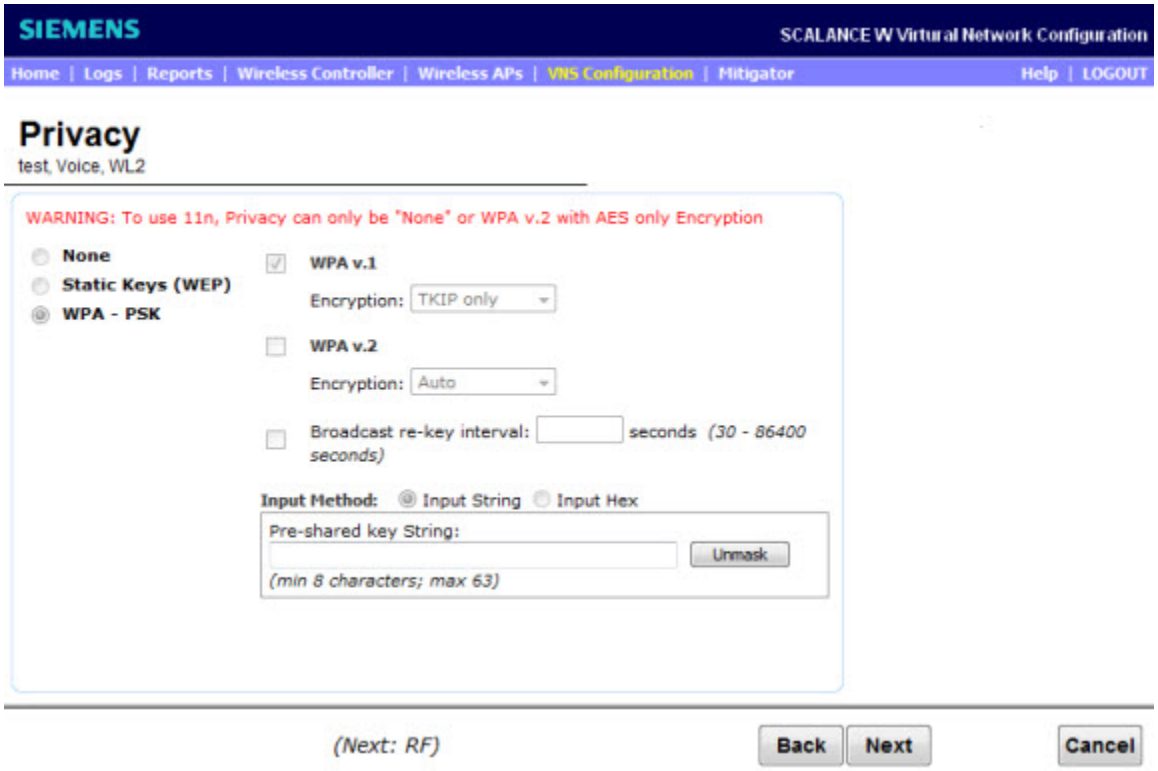


Table 7-3 Voice VNS DHCP Page - Fields and Buttons

Field/Button	Description
DHCP Option	From the drop-down list, click one of the following: **Use DHCP Relay** — Using DHCP relay forces the SCALANCE IWLAN Controller to forward DHCP requests to an external DHCP server on the enterprise network. DHCP relay bypasses the local DHCP server for the SCALANCE IWLAN Controller and allows the enterprise to manage IP address allocation to a VNS from its existing infrastructure. **DHCP Servers** — Type the IP address of the DHCP server to which DHCP discover and request messages will be forwarded for clients on this VNS. The SCALANCE IWLAN Controller does not handle DHCP requests from users, but instead forwards the requests to the indicated DHCP server. The DHCP server must be configured to match the VNS settings. In particular for a Routed VNS, the DHCP server must identify the SCALANCE IWLAN Controller's interface IP as the default Gateway (router) for the subnet. (Users intending to reach devices outside of the subnet will forward the packets to the default gateway (controller) for delivery upstream.) **Local DHCP Server** — If applicable, edit the local DHCP server settings.
DNS Servers	Type the IP Address of the Domain Name Servers to be used.
WINS	Type the IP address if the DHCP server uses Windows Internet Naming Service (WINS).

9. Click **Next**. The **Privacy** screen is displayed. Most options on this screen are view-only.



10. On the **Privacy** screen, do the following:
    - **Pre-shared key** — Type the shared secret key to be used between the wireless device and Wireless AP. The shared secret key is used to generate the 256-bit key.
    - **Mask/Unmask** — Click to display or hide your shared secret key.
11. Click **Next**. The **Radio Assignment** screen is displayed.

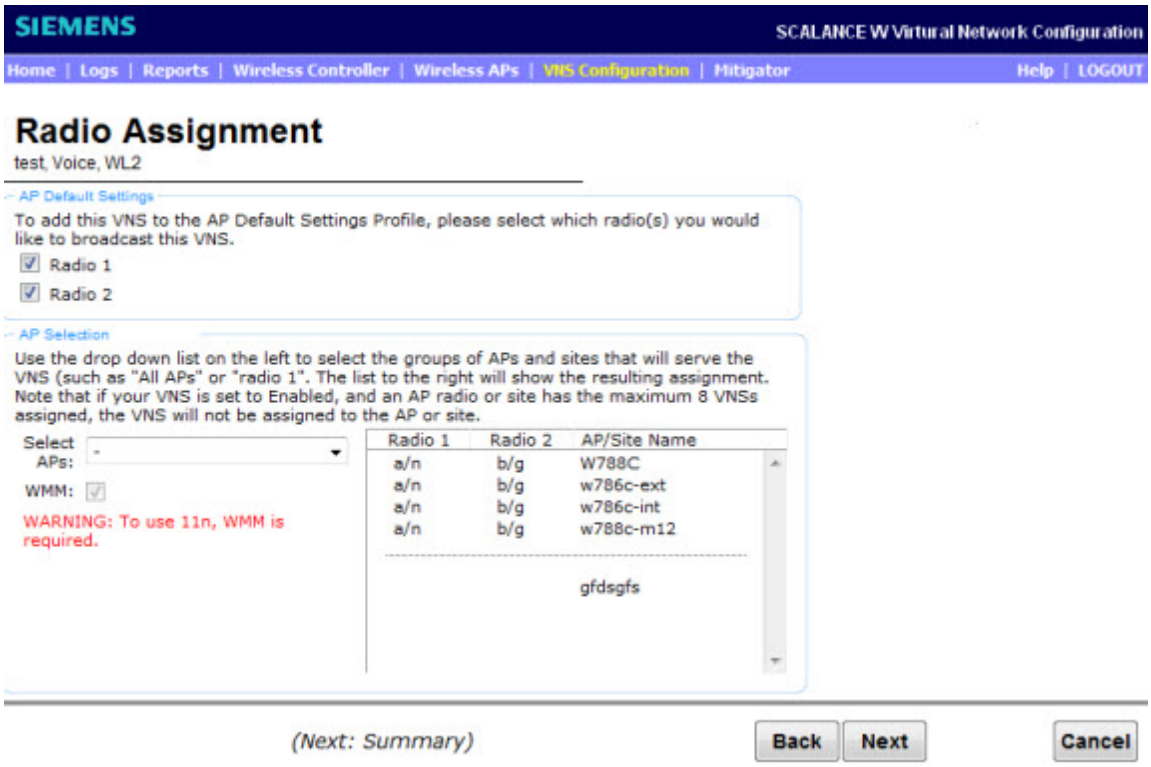

SIEMENS
SCALANCE W Virtual Network Configuration
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
Radio Assignment
test, Voice, WL2
AP Default Settings
To add this VNS to the AP Default Settings Profile, please select which radio(s) you would like to broadcast this VNS.
Radio 1
Radio 2
AP Selection
Use the drop down list on the left to select the groups of APs and sites that will serve the VNS (such as "All APs" or "radio 1". The list to the right will show the resulting assignment. Note that if your VNS is set to Enabled, and an AP radio or site has the maximum 8 VNSs assigned, the VNS will not be assigned to the AP or site.
Select APs:
WMM:
WARNING: To use 11n, WMM is required.
Radio 1
Radio 2
AP/Site Name
a/n b/g W788C
a/n b/g w786c-ext
a/n b/g w786c-int
a/n b/g w788c-m12
gfdsgfs
(Next: Summary)
Back
Next
Cancel

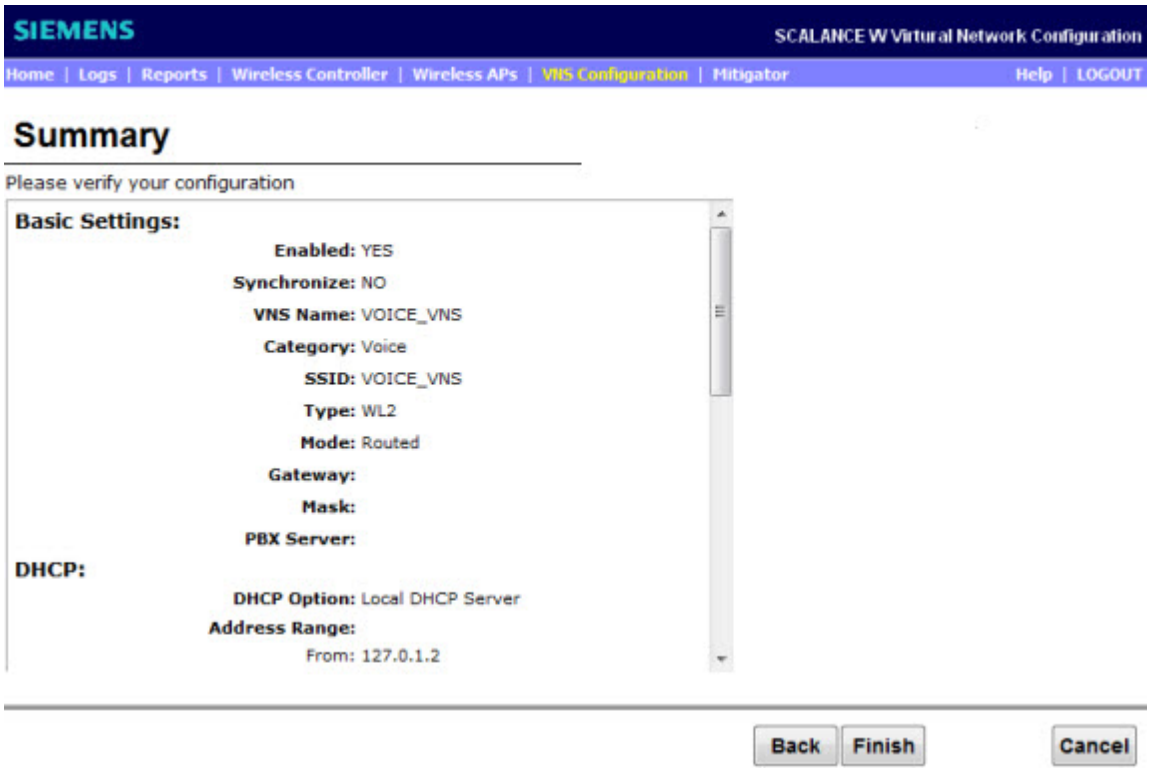
Table 7-4 Voice VNS Radio Assignment Page - Fields and Buttons

Field/Button	Description
AP Default Settings	
Radio 1 / Radio 2	Select the radios of the AP default settings profile that you want to broadcast the voice VNS.

Table 7-4 Voice VNS Radio Assignment Page - Fields and Buttons (continued)

Field/Button	Description
AP Selection	
Select APs	Select the group of APs that will broadcast the voice VNS: • **all radios** — Click to assign all of the APs' radios. • **radio 1** — Click to assign only the APs' Radio 1. • **radio 2**— Click to assign only the APs' Radio 2. • **local APs - all radios** — Click to assign only the local APs. • **local APs - radio 1** — Click to assign only the local APs' Radio 1. • **local APs - radio 2** — Click to assign only the local APs' Radio 2. • **foreign APs - all radios** — Click to assign only the foreign APs. • **foreign APs - radio 1** — Click to assign only the foreign APs' Radio 1. • **foreign APs - radio 2** — Click to assign only the foreign APs' Radio 2.
WMM	(Wi-Fi Multimedia), if enabled on an individual VNS, provides multimedia enhancements that improve the user experience for audio, video, and voice applications. WMM is part of the 802.11e standard for QoS. If enabled, the AP will accept WMM client associations, and will classify and prioritize the downlink traffic for all WMM clients. WMM clients will also classify and prioritize the uplink traffic.

12. Click **Next**. The **Summary** screen is displayed.



13. Confirm your voice VNS configuration. To revise your configuration, click **Back**.
14. To create your VNS, click **Finish**, and then click **Close**.
15. If applicable, you can continue to configure or edit the new VNS by clicking the individual VNS configuration tabs.

Creating a Data VNS Using the VNS Wizard

Use the VNS wizard to create a data-specific VNS that can be configured to use either SSID or AAA authentication.

When you create a new data VNS using the VNS wizard, you configure the VNS in the following stages:

- Basic settings
- Authentication settings
- DHCP settings
- Filter settings
- Privacy settings
- Radio assignment settings
- Summary

To configure a data VNS using the VNS wizard:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, expand the New pane, then click **START VNS WIZARD**. The **VNS Creation Wizard** screen is displayed.
3. Click **Start VNS Wizard**. The **VNS Creation Wizard** screen is displayed.
4. In the **Name** box, type a name for the data VNS.
5. In the **Category** drop-down list, click **Data**, and then click **Next**. The **Basic Settings** screen is displayed.

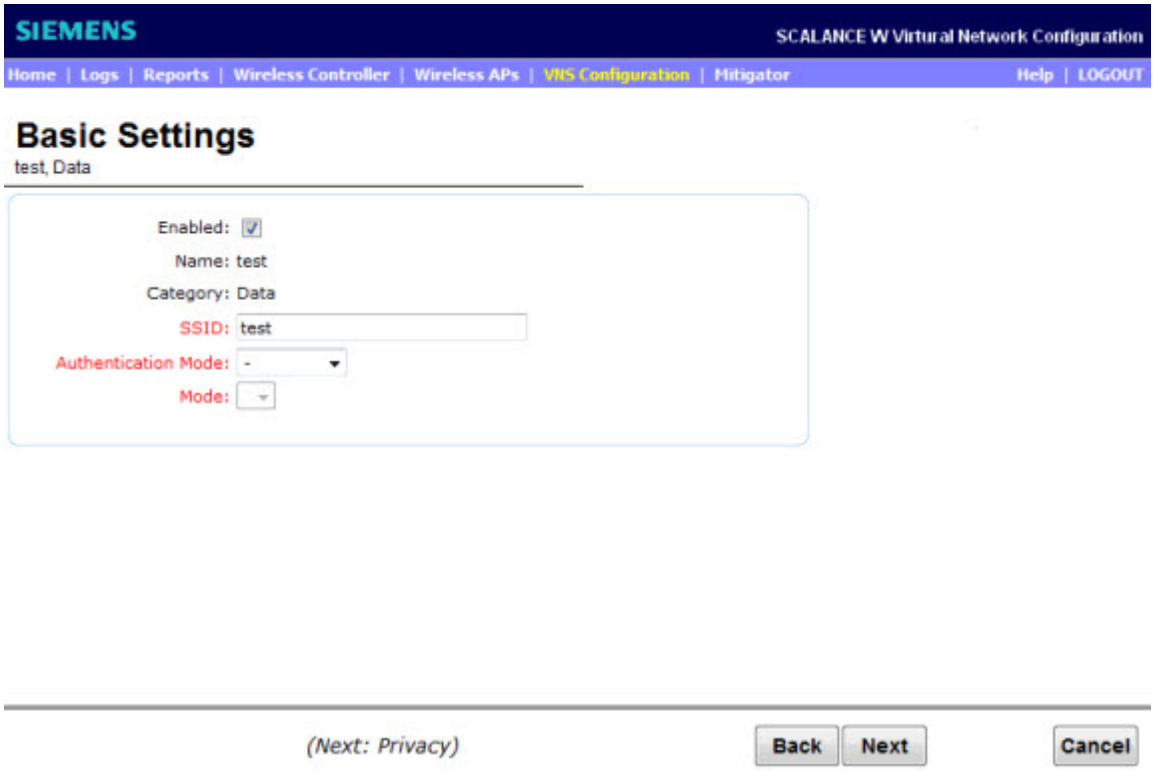


Table 7-5 Data VNS Basic Settings Page - Fields and Buttons

Field/Button	Description
Enabled	By default, the **Enabled** checkbox for the new VNS is enabled. A VNS must be enabled for it to be able to provide service for mobile user traffic.
Synchronize	By default, the **Synchronize** checkbox for the new VNS is disabled.
Name	Identifies the name of the VNS.
Category	Identifies the VNS category.
SSID	Identifies the SSID assigned to the VNS.
Authentication Mode	Click the type of network assignment for the VNS. There are two options for network assignment, **Disabled** or **802.1x**.

Table 7-5 Data VNS Basic Settings Page - Fields and Buttons (continued)

Field/Button	Description
Mode	Click the VNS mode you want to assign: • **Routed** is a VNS type where user traffic is tunneled to the SCALANCE IWLAN Controller. • **Bridge Traffic Locally at WLC** is a VNS type where user traffic is tunneled to the SCALANCE IWLAN Controller and is directly bridged at the controller to a specific VLAN. With this VNS type, mobile users become a natural extension of a VLAN subnet. For each Bridge Traffic Locally at WLC VNS that is created, a VLAN needs to be specified. In addition, the network port on which the VLAN is assigned must be configured on the switch, and the corresponding SCALANCE IWLAN Controller interface must match the correct VLAN. • **Bridge Traffic Locally at AP** is a VNS type where user traffic is directly bridged to a VLAN at the AP network point of access (switch port).
Routed Data VNS	
Gateway	Type the SCALANCE IWLAN Controller's own IP address of the topology associated with that VNS. This IP address is the default gateway for the VNS. The SCALANCE IWLAN Controller advertises this address to the wireless devices when they sign on. For routed VNSs, it corresponds to the IP address that is communicated to mobile users (in the VNS) as the default gateway for the VNS subnet. (Mobile users target the SCALANCE IWLAN Controller's interface in their effort to route packets to an external host).
Mask	Type the appropriate subnet mask for this IP address to separate the network portion from the host portion of the address (typically 255.255.255.0).
Enable Authentication	This option is enabled by default if the **Type** is 802.1x.
Enable DHCP	By default, this option is enabled for a routed data VNS.
Bridged Traffic Locally @ AP Data VNS	
Tagged	Select if you want to assign this VNS to a specific VLAN.
VLAN ID	Type the VLAN tag to which the SCALANCE IWLAN Controller will be bridged for the data VNS.
Untagged	Select if you want this VNS to be untagged. This option is selected by default.
Enable Authentication	If applicable, select this checkbox to enable authentication for the new data VNS. This option is enabled by default if the **Type** is 802.1x.
Bridge Traffic Locally at WLC Data VNS	
Interface	Click the physical port that provides the access to the VLAN.
Interface IP address	Type the IP address of the SCALANCE IWLAN Controller’s interface on the VLAN.

Table 7-5 Data VNS Basic Settings Page - Fields and Buttons (continued)

Field/Button	Description
Mask	Type the appropriate subnet mask for this IP address to separate the network portion from the host portion of the address (typically 255.255.255.0).
VLAN ID	Type the VLAN tag to which the SCALANCE IWLAN Controller will be bridged for the VNS.
Enable Authentication	If applicable, select this checkbox to enable authentication for the new data VNS. This option is enabled by default if the **Type** is 802.1x.
Enable DHCP	If applicable, select this checkbox to enable DHCP authentication for the new data VNS.

6. Click **Next**. The **Authentication** screen is displayed.

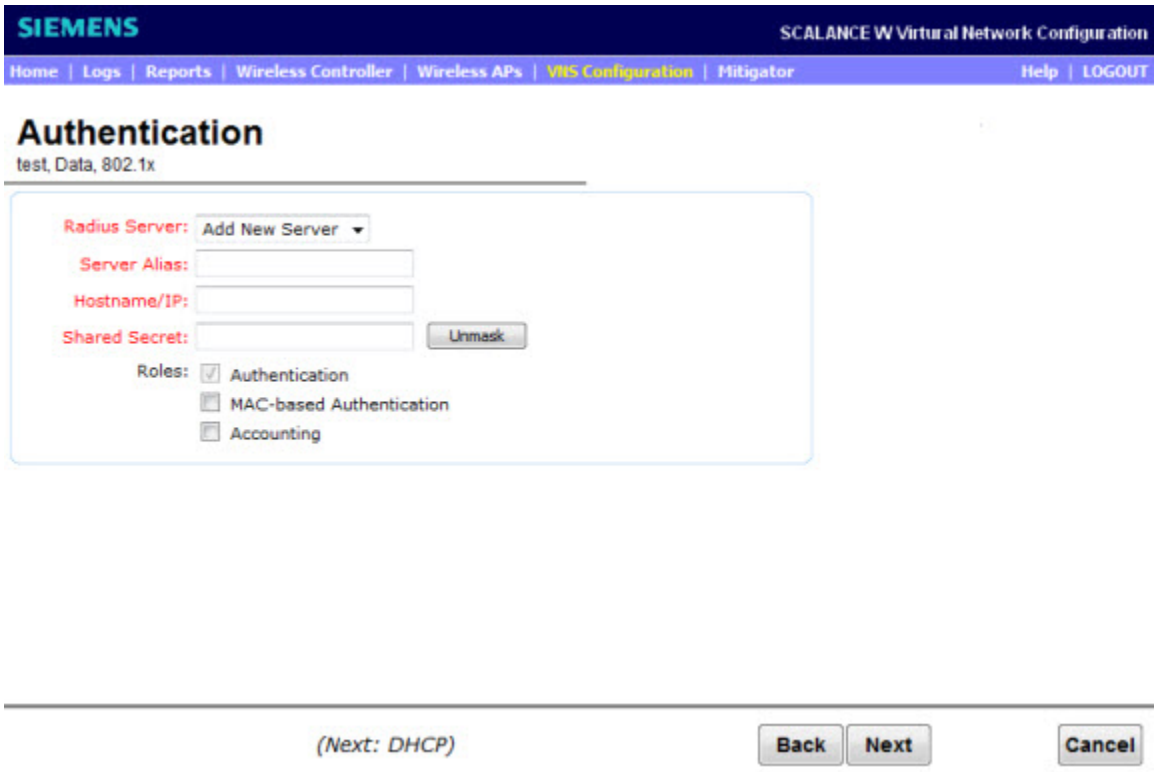


Table 7-6 Data VNS Authentication Page - Fields and Buttons

Field/Button	Description
Radius Server	Click the RADIUS server you want to assign to the new data VNS, or click **Add New Server** and then do the following
Server Alias	Type a name you want to assign to the new RADIUS server.
Hostname/IP	Type either the RADIUS server's FQDN (fully qualified domain name) or IP address.

Table 7-6 Data VNS Authentication Page - Fields and Buttons (continued)

Field/Button	Description
Shared Secret	Type the password that will be used to validate the connection between the SCALANCE IWLAN Controller and the RADIUS server.
Mask/Unmask	Click to display or hide your shared secret key.
Roles	Select the authentication role options for the RADIUS server: **MAC-based Authentication** — Select to enable the RADIUS server to perform MAC-based authentication on the data VNS. If applicable, and the **MAC-based authentication** option is enabled, select to enable **MAC-based authorization on roam**.

7. Click **Next**. The **DHCP** screen is displayed, if DHCP was enabled previously.

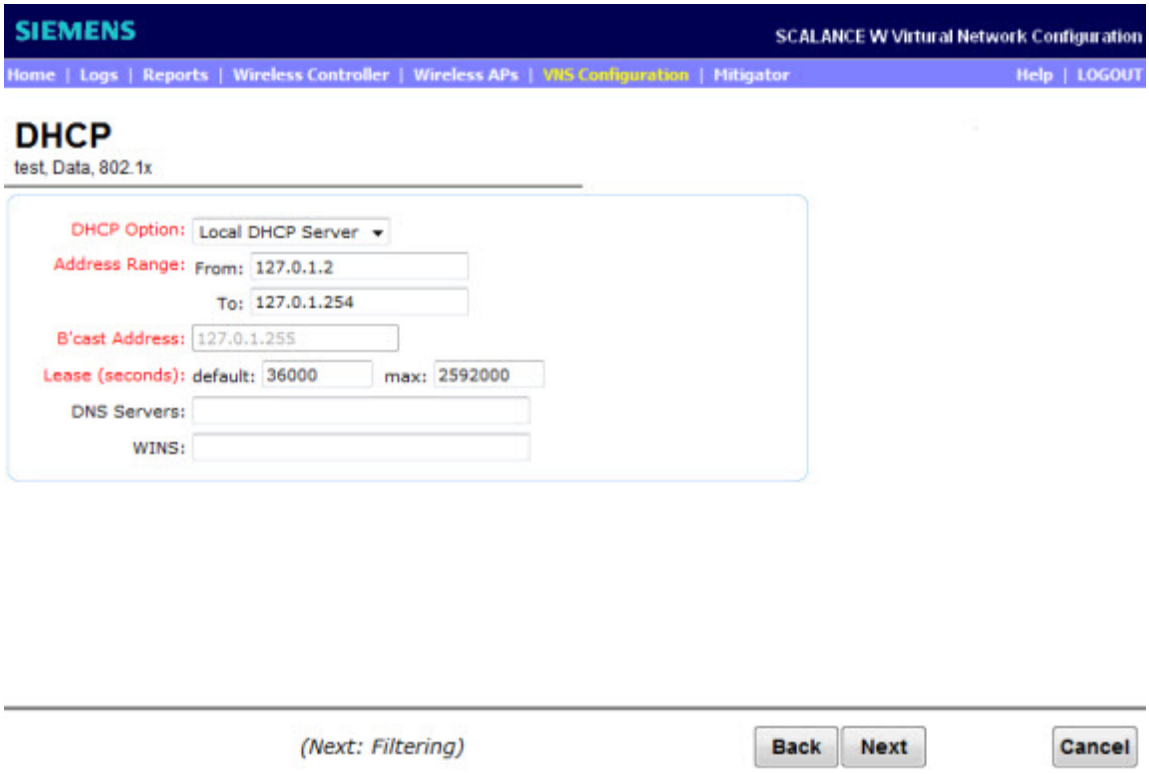


Table 7-7 Data VNS DHCP Page - Fields and Buttons

Field/Button	Description
DHCP Option	In the **DHCP Option** drop-down list, click one of the following: **Use DHCP Relay** — Using DHCP relay forces the SCALANCE IWLAN Controller to forward DHCP requests to an external DHCP server on the enterprise network. DHCP relay bypasses the local DHCP server for the SCALANCE IWLAN Controller and allows the enterprise to manage IP address allocation to a VNS from its existing infrastructure. **DHCP Servers** — If **Use DHCP Relay** was selected, type the IP address of the DHCP server to which DHCP discover and request messages will be forwarded for clients on this VNS. The SCALANCE IWLAN Controller does not handle DHCP requests from users, but instead forwards the requests to the indicated DHCP server. The DHCP server must be configured to match the VNS settings. In particular for a Routed VNS, the DHCP server must identify the SCALANCE IWLAN Controller's interface IP as the default Gateway (router) for the subnet. (Users intending to reach devices outside of the subnet will forward the packets to the default gateway (controller) for delivery upstream.) **Local DHCP Server** — If applicable, edit the local DHCP server settings.
DNS Server	Type the IP Address of the Domain Name Servers to be used.
WINS	Type the IP address if the DHCP server uses Windows Internet Naming Service (WINS).

8. Click **Next**. The **Filtering** screen is displayed.
9. On the **Filtering** screen, do the following:
   – In the **Filter ID** drop-down list, click one of the following:
      - **Default** — Controls access if there is no matching filter ID for a user.
      - **Exception** — Protects access to the SCALANCE IWLAN Controller’s own interfaces, including the VNSs own interface. VNS exception filters are applied to user traffic intended for the SCALANCE IWLAN Controller's own interface point on the VNS. These filters are applied after the user's specific VNS state assigned filters.
10. In the **Filter** table, select the **Allow** or **Deny** option buttons for each filter if applicable, and then select the **Enable** checkbox accordingly.

11. Click **Next**. The **Privacy** screen is displayed.

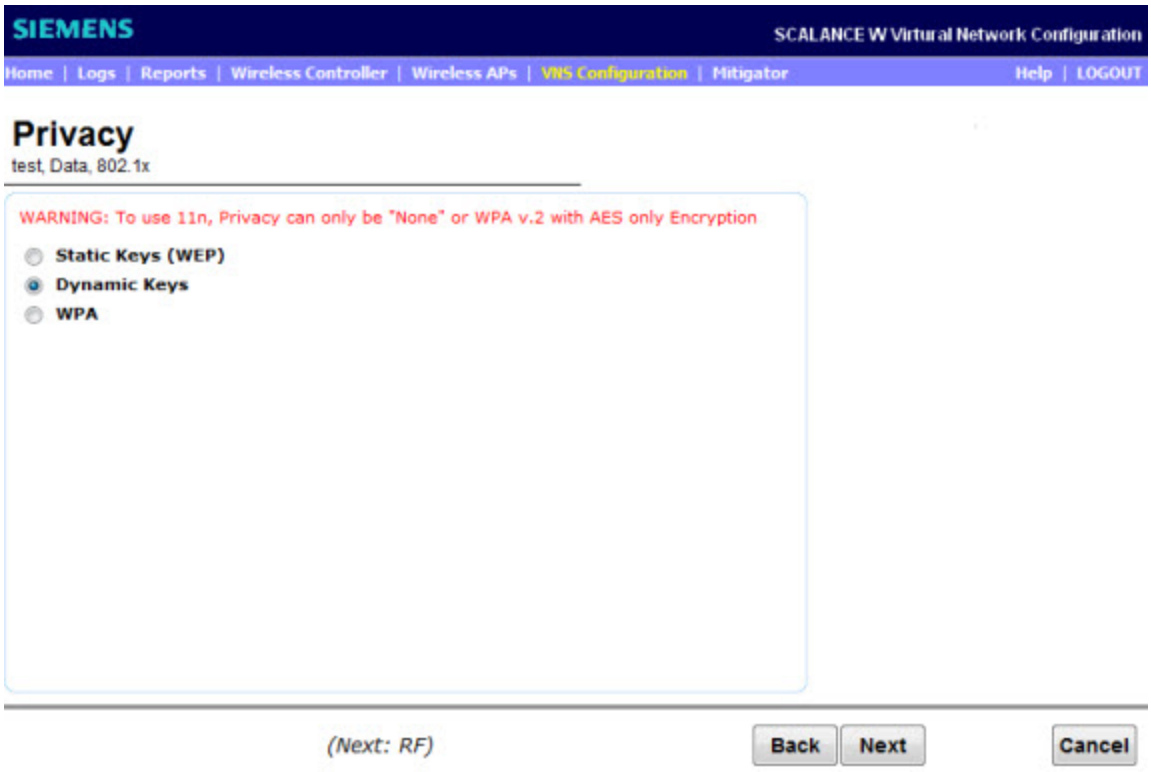

SIEMENS
SCALANCE W Virtual Network Configuration
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
Privacy
test, Data, 802.1x
WARNING: To use 11n, Privacy can only be "None" or WPA v.2 with AES only Encryption
Static Keys (WEP)
Dynamic Keys
WPA
(Next: RF)
Back
Next
Cancel

Table 7-8 Data VNS Privacy Page - Fields and Buttons

Field/Button	Description
Static Keys (WEP)	Select to configure static keys. Then enter: **WEP Key Index** — Click the WEP encryption key index: **1**, **2**, **3**, or **4**. **Note:** Specifying the WEP key index is supported only for W78xC Wireless APs. **WEP Key Length** — Click the WEP encryption key length: **64 bit**, **128 bit**, or **152 bit**. Select an **Input Method**: **Input Hex** — type the WEP key input in the WEP Key box. The key is generated automatically based on the input. **Input String** — type the secret WEP key string used for encrypting and decrypting in the **WEP Key String** box. The **WEP Key** box is automatically filled by the corresponding Hex code.
Dynamic Keys	Select to allow the dynamic key WEP mechanism to change the key for each user and each session.

Table 7-8 Data VNS Privacy Page - Fields and Buttons (continued)

Field/Button	Description
WPA	Select to configure Wi-Fi Protected Access (WPA v1 and WPA v2), a security solution that adds authentication to enhanced WEP encryption and key management. To enable WPA v1 encryption, select **WPA v.1**. In the **Encryption** drop-down list, select one of the following encryption types: **Auto** — The Wireless AP will advertise both TKIP and CCMP (Counter Mode with Cipher Block Chaining Message Authentication Code Protocol) for WPAv1. CCMP is an IEEE 802.11i encryption protocol that uses the encryption cipher AES (Advanced Encryption Standard). **TKIP only** — The AP will advertise TKIP as an available encryption protocol for WPAv1. It will not advertise CCMP. To enable WPA v2 encryption, select **WPA v.2**. In the **Encryption** drop-down list, click one of the following encryption types: **Auto** — The AP advertises both TKIP and CCMP (counter mode with cipher block chaining message authentication code protocol). CCMP is an IEEE 802.11i encryption protocol that uses the encryption cipher AES (Advanced Encryption Standard).
WPA-PSK	**AES only** — The AP advertises CCMP as an available encryption protocol. It will not advertise TKIP. To enable re-keying after a time interval, select **Broadcast re-key interval**, then type the time interval after which the broadcast encryption key is changed automatically. The default is 3600. If this checkbox is not selected, the Broadcast encryption key is never changed and the Wireless AP will always use the same broadcast key for Broadcast/Multicast transmissions. This will reduce the level of security for wireless communications. To enable the group key power save retry, select **Group Key Power Save Retry**. **Note:** The group key power save retry is supported only for W78xC Wireless APs. In the **Pre-shared key** box, type the shared secret key to be used between the wireless device and Wireless AP. The shared secret key is used to generate the 256-bit key. **Mask/Unmask** — Click to display or hide your shared secret key.

12. Click **Next**. The **Radio Assignment** screen is displayed.

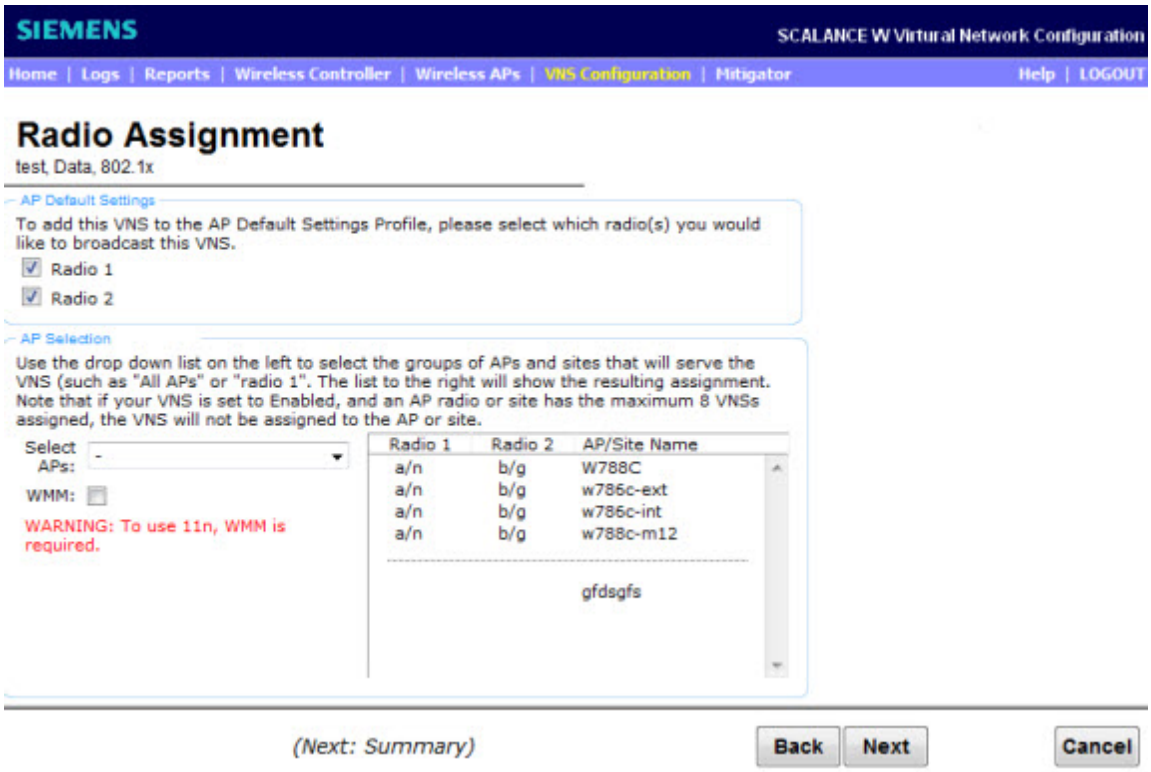
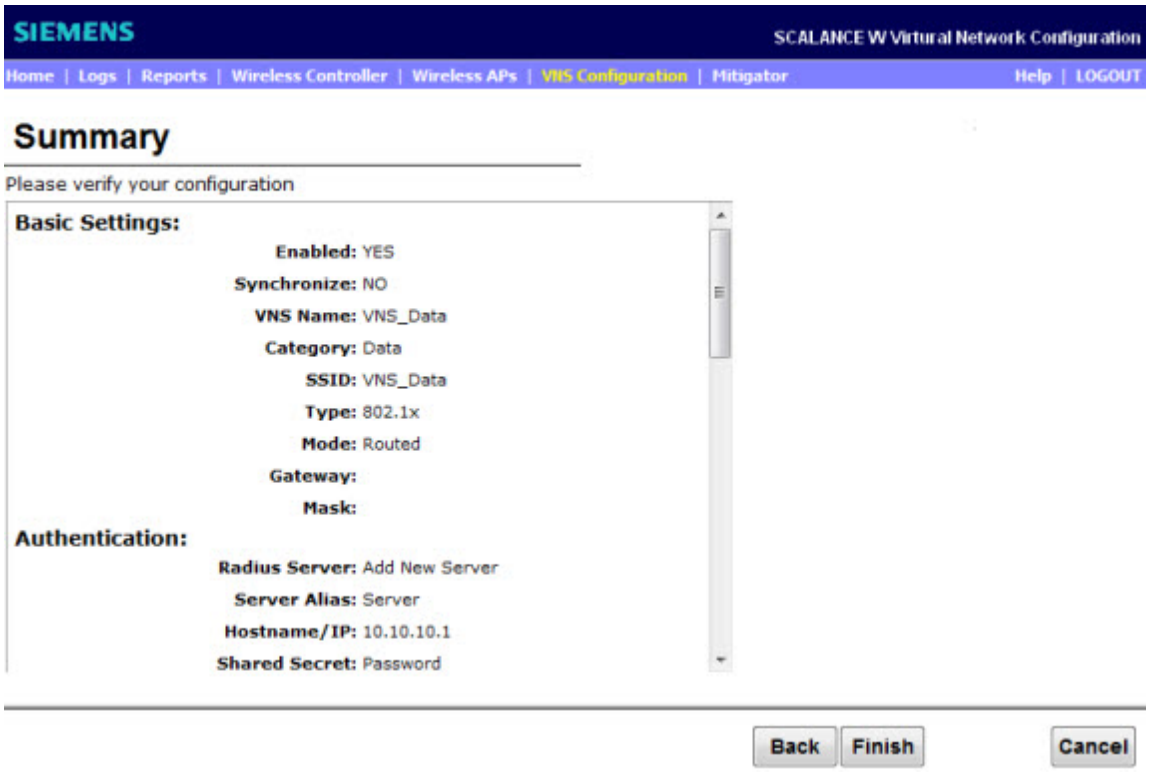

SIEMENS
SCALANCE W Virtural Network Configuration
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
Radio Assignment
test, Data, 802.1x
AP Default Settings
To add this VNS to the AP Default Settings Profile, please select which radio(s) you would like to broadcast this VNS.
Radio 1
Radio 2
AP Selection
Use the drop down list on the left to select the groups of APs and sites that will serve the VNS (such as "All APs" or "radio 1". The list to the right will show the resulting assignment. Note that if your VNS is set to Enabled, and an AP radio or site has the maximum 8 VNSs assigned, the VNS will not be assigned to the AP or site.
Select APs:
WMM:
WARNING: To use 11n, WMM is required.
Radio 1
Radio 2
AP/Site Name
a/n b/g W788C
a/n b/g w786c-ext
a/n b/g w786c-int
a/n b/g w788c-m12
gfdsgfs
(Next: Summary)
Back
Next
Cancel

Table 7-9 Data VNS Radio Assignment Page - Fields and Buttons

Field/Button	Description
AP Default Settings	
Radio 1 / Radio 2	Select the radios of the AP default settings profile that you want to broadcast the data VNS.
AP Selection	
Select APs	Select the group of APs that will broadcast the data VNS: • **all radios** — Click to assign all of the APs' radios. • **radio 1** — Click to assign only the APs' Radio 1. • **radio 2**— Click to assign only the APs' Radio 2. • **local APs - all radios** — Click to assign only the local APs. • **local APs - radio 1** — Click to assign only the local APs' Radio 1. • **local APs - radio 2** — Click to assign only the local APs' Radio 2. • **foreign APs - all radios** — Click to assign only the foreign APs. • **foreign APs - radio 1** — Click to assign only the foreign APs' Radio 1. • **foreign APs - radio 2** — Click to assign only the foreign APs' Radio 2.
WMM	(Wi-Fi Multimedia), if enabled on an individual VNS, provides multimedia enhancements that improve the user experience for audio, video, and voice applications. WMM is part of the 802.11e standard for QoS. If enabled, the AP will accept WMM client associations, and will classify and prioritize the downlink traffic for all WMM clients. WMM clients will also classify and prioritize the uplink traffic.

13. Click **Next**. The **Summary** screen is displayed.



14. Confirm your data VNS configuration. To revise your configuration, click **Back**.
15. To create your VNS, click **Finish**, and then click **Close**.

    The data VNS is created and saved.
16. If applicable, you can continue to configure or edit the new VNS by clicking the individual VNS configuration tabs.

    If the SCALANCE IWLAN Controller is configured to be part of an availability pair, you can chose to synchronize the VNS on the secondary SCALANCE IWLAN Controller. See Chapter 12, **Availability and Session Availability** for more information.

Creating a Captive Portal VNS Using the VNS Wizard

Use the VNS wizard to create a Captive Portal VNS. A Captive Portal VNS employs an authentication method that uses a Web redirection which directs a mobile user's Web session to an authentication server. Typically, the mobile user must provide their credentials (user ID, password) to be authenticated. You can create the following types of Captive Portal VNSs:

- **Internal Captive Portal** — The SCALANCE IWLAN Controller's own Captive Portal authentication page — configured as an editable form — is used to request user credentials. The redirection triggers the locally stored authentication page where the mobile user must provide the appropriate credentials, which then is checked against what is listed in the configured RADIUS server.
- **External Captive Portal** — An entity outside of the SCALANCE IWLAN Controller is responsible for handling the mobile user authentication process, presenting the credentials

request forms and performing user authentication procedures. The external Web server location must be explicitly listed as an allowed destination in the non-authenticated filter.

- **GuestPortal** — A GuestPortal VNS provides wireless device users with temporary guest network services.

When you create a new captive portal VNS using the VNS wizard, you configure the VNS in the following stages:

- Basic settings
- Authentication settings
- DHCP settings
- Filter settings
- Privacy settings
- Radio assignment settings
- Summary review

Creating an Internal Captive Portal VNS

To Configure an Internal Captive Portal VNS Using the VNS Wizard:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, expand the New pane, then click **START VNS WIZARD**. The **VNS Creation Wizard** screen is displayed.
3. In the **Name** box, type a name for the Captive Portal VNS.

4. In the **Category** drop-down list, click **Captive Portal**, and then click **Next**. The **Basic Settings** screen is displayed.

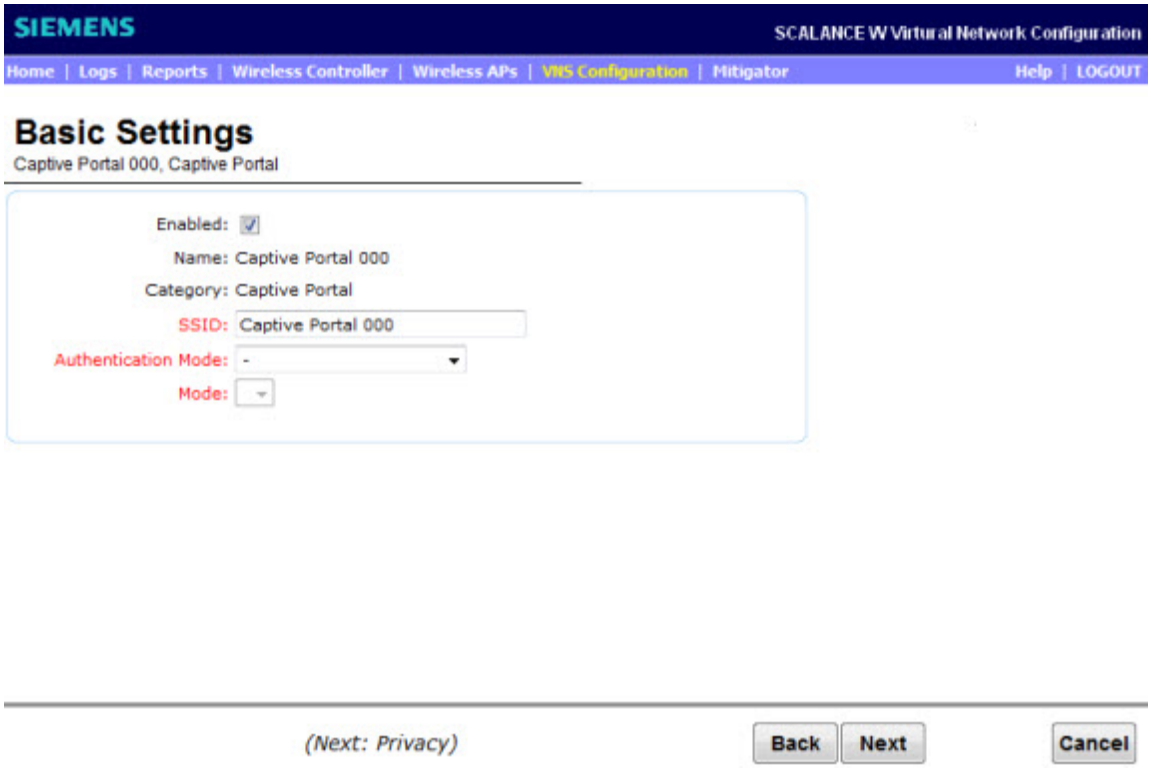


Table 7-10 Captive Portal Basic Settings Page - Fields and Buttons

Field/Button	Description
Enabled	By default, the **Enabled** checkbox for the new VNS is enabled. A VNS must be enabled for it to be able to provide service for mobile user traffic.
Name	Identifies the name of the VNS.
Category	Identifies the VNS category.
SSID	Identifies the SSID assigned to the VNS.
Authentication Mode	Click **Internal Captive Portal**
Mode	Click the VNS Mode you want to assign: **Routed** is a VNS type where user traffic is tunneled to the SCALANCE IWLAN Controller. **Bridge Traffic Locally at WLC** is a VNS type where user traffic is tunneled to the SCALANCE IWLAN Controller and is directly bridged at the controller to a specific VLAN. With this VNS type, mobile users become a natural extension of a VLAN subnet. For each Bridge Traffic Locally at WLC VNS that is created, a VLAN needs to be specified. In addition, the network port on which the VLAN is assigned must be configured on the switch, and the corresponding SCALANCE IWLAN Controller interface must match the correct VLAN.
Routed Internal Captive Portal	

Table 7-10 Captive Portal Basic Settings Page - Fields and Buttons (continued)

Field/Button	Description
Gateway	**Gateway** — Type the SCALANCE IWLAN Controller's own IP address in that VNS. This IP address is the default gateway for the VNS. The SCALANCE IWLAN Controller advertises this address to the wireless devices when they sign on. For routed VNSs, it corresponds to the IP address that is communicated to mobile users (in the VNS) as the default gateway for the VNS subnet. (Mobile users target the SCALANCE IWLAN Controller's interface in their effort to route packets to an external host).
Mask	Type the appropriate subnet mask for this IP address to separate the network portion from the host portion of the address (typically 255.255.255.0).
Message	Type a brief message that will be displayed above the Login button that greets the mobile device user.
Enable Authentication	By default, this option is selected if the **VNS Type** is **Internal Captive Portal**, which enables authentication for the new Captive Portal VNS.
Enable DHCP	By default, this option is selected if the **VNS Type** is **Internal Captive Portal**, which enables DHCP authentication for the new Captive Portal VNS.
Bridge Traffic Locally- Voice VNS	
Interface	Click the physical interface that provides the access to the VLAN.
Interface IP address	Type the IP address of the SCALANCE IWLAN Controller’s interface on the VLAN.
Mask	Type the appropriate subnet mask for this IP address to separate the network portion from the host portion of the address (typically 255.255.255.0).
VLAN ID	Type the VLAN tag to which the SCALANCE IWLAN Controller will be bridged for the VNS.
Message	Type a brief message that will be displayed above the Login button that greets the mobile device user.
Enable Authentication	By default, this option is selected if the **VNS Type** is **Internal Captive Portal**, which enables authentication for the new Captive Portal VNS.
Enable DHCP	If applicable, select this checkbox to enable DHCP authentication for the new Captive Portal VNS.

5. Click **Next**. The **Authentication** screen is displayed.

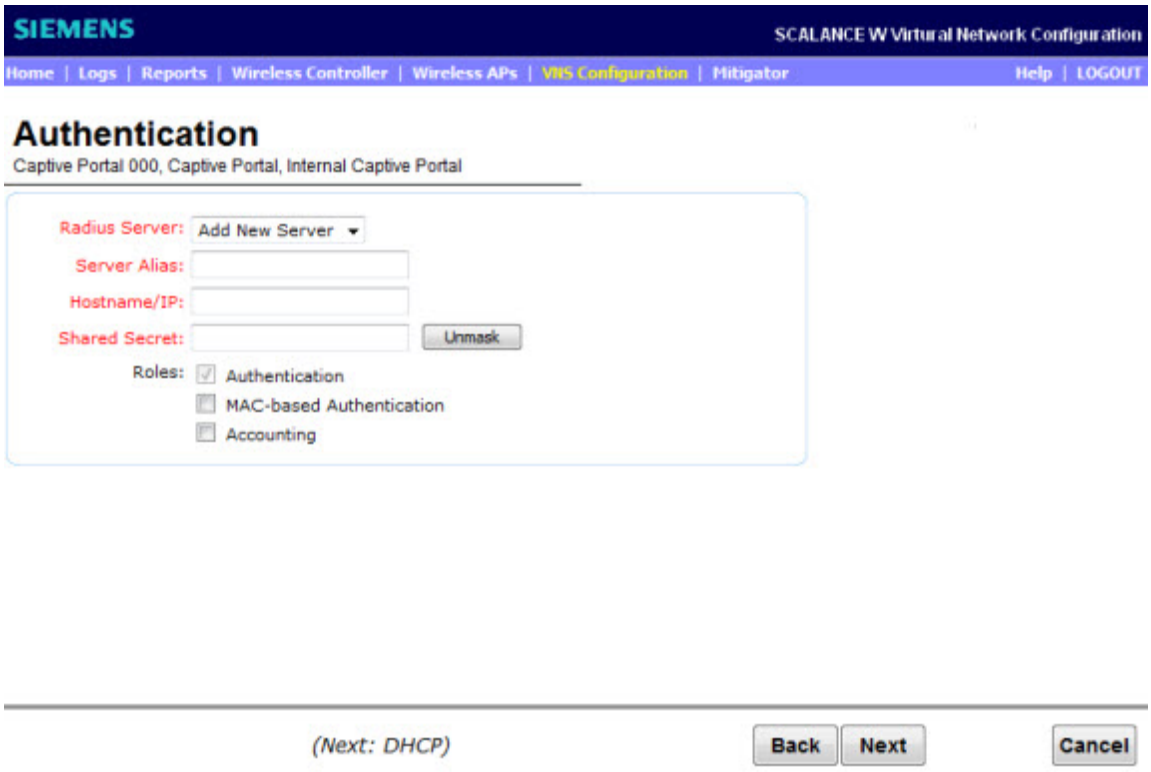


Table 7-11 Captive Portal Authentication Page - Fields and Buttons

Field/Button	Description
Radius Server	Click the RADIUS server you want to assign to the new Captive Portal VNS, or click **Add New Server** and then do the following
Server Alias	Type a name you want to assign to the new RADIUS server.
Hostname/IP	Type either the RADIUS server's FQDN (fully qualified domain name) or IP address.
Shared Secret	Type the password that will be used to validate the connection between the SCALANCE IWLAN Controller and the RADIUS server.
Mask/Unmask	Click to display or hide your shared secret key.
Roles	Select the authentication role options for the RADIUS server: **Authentication** — By default, this option is selected if the **VNS Type** is **Internal Captive Portal**, which enables the RADIUS server to perform authentication on the Captive Portal VNS. **MAC-based Authentication** — Select to enable the RADIUS server to perform MAC-based authentication on the Captive Portal VNS. If the **MAC-based authentication** option is enabled, select to enable **MAC-based authorization on roam**, if applicable. **Accounting** — Select to enable the RADIUS server to perform accounting on the Captive Portal VNS.

6. Click **Next**. The **DHCP** screen is displayed.

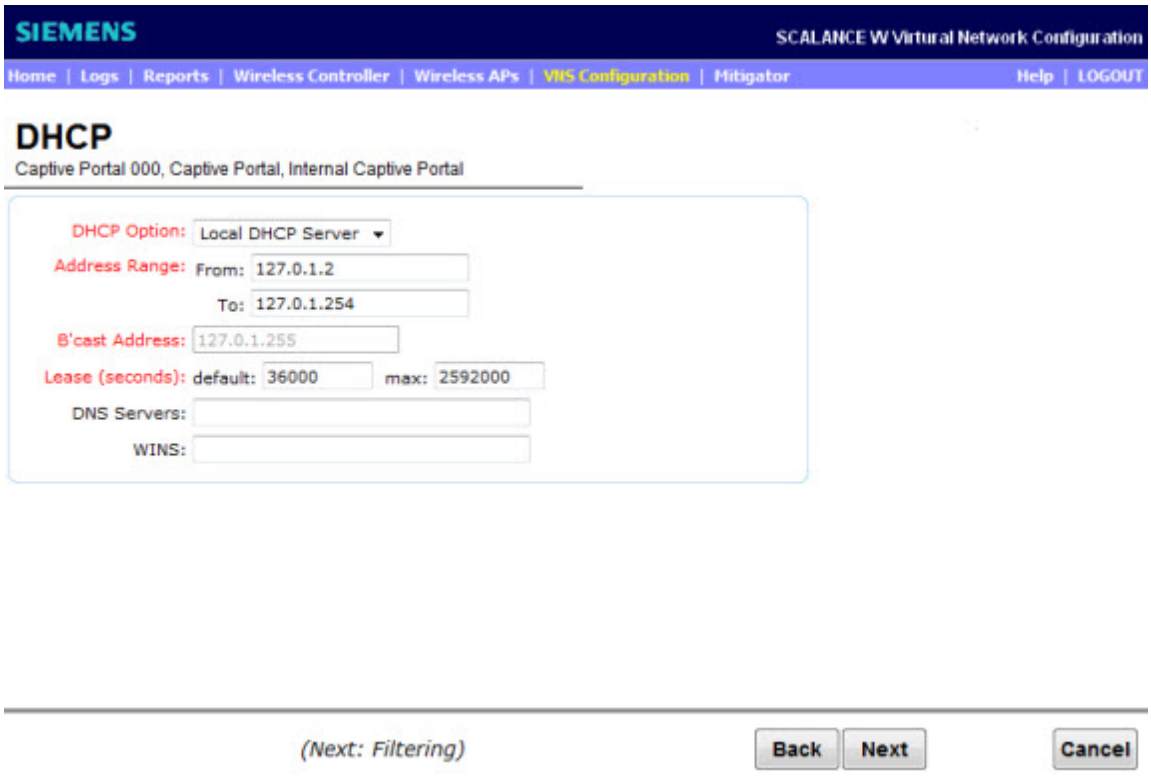


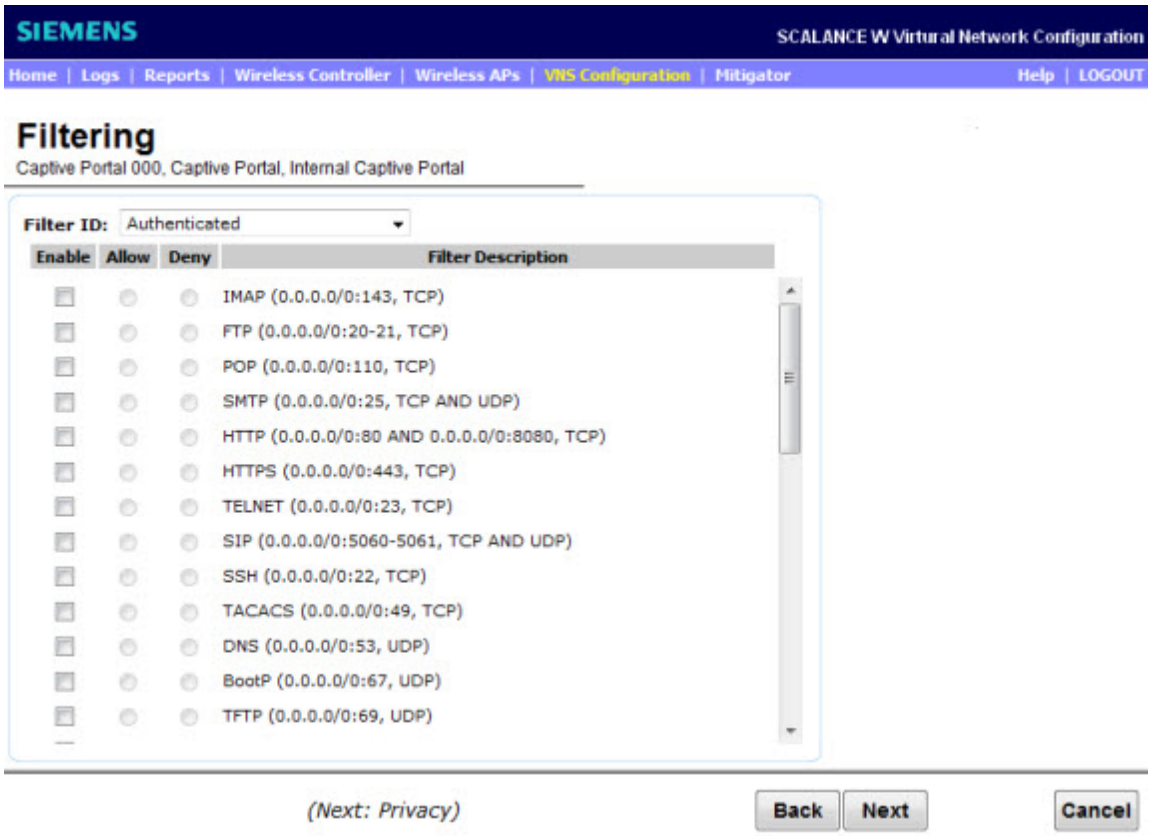
Table 7-12 Captive Portal DHCP Page - Fields and Buttons

Field/Button	Description
DHCP Option	In the **DHCP Option** drop-down list, click one of the following: **Use DHCP Relay** — Using DHCP relay forces the SCALANCE IWLAN Controller to forward DHCP requests to an external DHCP server on the enterprise network. DHCP relay bypasses the local DHCP server for the SCALANCE IWLAN Controller and allows the enterprise to manage IP address allocation to a VNS from its existing infrastructure. **DHCP Servers** — If **Use DHCP Relay** was selected, type the IP address of the DHCP server to which DHCP discover and request messages will be forwarded for clients on this VNS. The SCALANCE IWLAN Controller does not handle DHCP requests from users, but instead forwards the requests to the indicated DHCP server. The DHCP server must be configured to match the VNS settings. In particular for a Routed VNS, the DHCP server must identify the SCALANCE IWLAN Controller's interface IP as the default Gateway (router) for the subnet. (Users intending to reach devices outside of the subnet will forward the packets to the default gateway (controller) for delivery upstream.) **Local DHCP Server** — If applicable, edit the local DHCP server settings.
DNS Server	Type the IP Address of the Domain Name Servers to be used.

Table 7-12 Captive Portal DHCP Page - Fields and Buttons

Field/Button	Description
WINS	Type the IP address if the DHCP server uses Windows Internet Naming Service (WINS).

7. Click **Next**. The **Filtering** screen is displayed.



8. On the **Filtering** screen, do the following:
   - In the **Filter ID** drop-down list, click one of the following:
     - **Default** — Controls access if there is no matching filter ID for a user.
     - **Exception** — Protects access to the SCALANCE IWLAN Controller's own interfaces, including the VNSs own interface. VNS exception filters are applied to user traffic intended for the SCALANCE IWLAN Controller's own interface point on the VNS. These filters are applied after the user's specific VNS state assigned filters.
     - **Non-Authenticated** — Controls network access and also used to direct mobile users to a Captive Portal Web page for login.
9. In the **Filter** table, select the **Allow** or **Deny** option buttons for each filter if applicable, and then select the **Enable** checkbox accordingly.

10. Click **Next**. The **Privacy** screen is displayed.

SIEMENS
SCALANCE W Virtural Network Configuration
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
Privacy
Captive Portal 000, Captive Portal, Internal Captive Portal
WARNING: To use 11n, Privacy can only be "None" or WPA v.2 with AES only Encryption
None
Static Keys (WEP)
WPA - PSK
(Next: RF)
Back
Next
Cancel

Table 7-13 Captive Portal Privacy Page - Fields and Buttons

Field/Button	Description
None	Select if you do not want to assign any privacy mechanism.
Static Keys (WEP)	Select to configure static keys. Then enter: **WEP Key Index** — Click the WEP encryption key index: **1**, **2**, **3**, or **4**. **Note:** Specifying the WEP key index is supported only for W78xC Wireless APs. **WEP Key Length** — Click the WEP encryption key length: **64 bit**, **128 bit**, or **152 bit**. Select an **Input Method**: **Input Hex** — type the WEP key input in the WEP Key box. The key is generated automatically based on the input. **Input String** — type the secret WEP key string used for encrypting and decrypting in the **WEP Key String** box. The **WEP Key** box is automatically filled by the corresponding Hex code.

Table 7-13 Captive Portal Privacy Page - Fields and Buttons (continued)

Field/Button	Description
WPA-PSK	Select to use a Pre-Shared Key (PSK), or shared secret for authentication. WPA-PSK (Wi-Fi Protected Access Pre-Shared key) is a security solution that adds authentication to enhanced WEP encryption and key management. WPA-PSK mode does not require an authentication server. It is suitable for home or small office. To enable WPA v1 encryption, select **WPA v.1**. In the **Encryption** drop-down list, select one of the following encryption types: **Auto** — The Wireless AP will advertise both TKIP and CCMP (Counter Mode with Cipher Block Chaining Message Authentication Code Protocol) for WPAv1. CCMP is an IEEE 802.11i encryption protocol that uses the encryption cipher AES (Advanced Encryption Standard). **TKIP only** — The AP will advertise TKIP as an available encryption protocol for WPAv1. It will not advertise CCMP. To enable WPA v2 encryption, select **WPA v.2**. In the **Encryption** drop-down list, click one of the following encryption types: **Auto** — The AP advertises both TKIP and CCMP (counter mode with cipher block chaining message authentication code protocol). CCMP is an IEEE 802.11i encryption protocol that uses the encryption cipher AES (Advanced Encryption Standard). **AES only** — The AP advertises CCMP as an available encryption protocol. It will not advertise TKIP. To enable re-keying after a time interval, select **Broadcast re-key interval**. If this checkbox is not selected, the Broadcast encryption key is never changed and the Wireless AP will always use the same broadcast key for Broadcast/Multicast transmissions. This will reduce the level of security for wireless communications. In the **Broadcast re-key interval** box, type the time interval after which the broadcast encryption key is changed automatically. To enable the group key power save retry, select **Group Key Power Save Retry**. **Note:** The group key power save retry is supported only for W78xC Wireless APs. In the **Pre-shared key** box, type the shared secret key to be used between the wireless device and Wireless AP. The shared secret key is used to generate the 256-bit key. **Mask/Unmask** — Click to display or hide your shared secret key.

11. Click **Next**. The **Radio Assignment** screen is displayed.

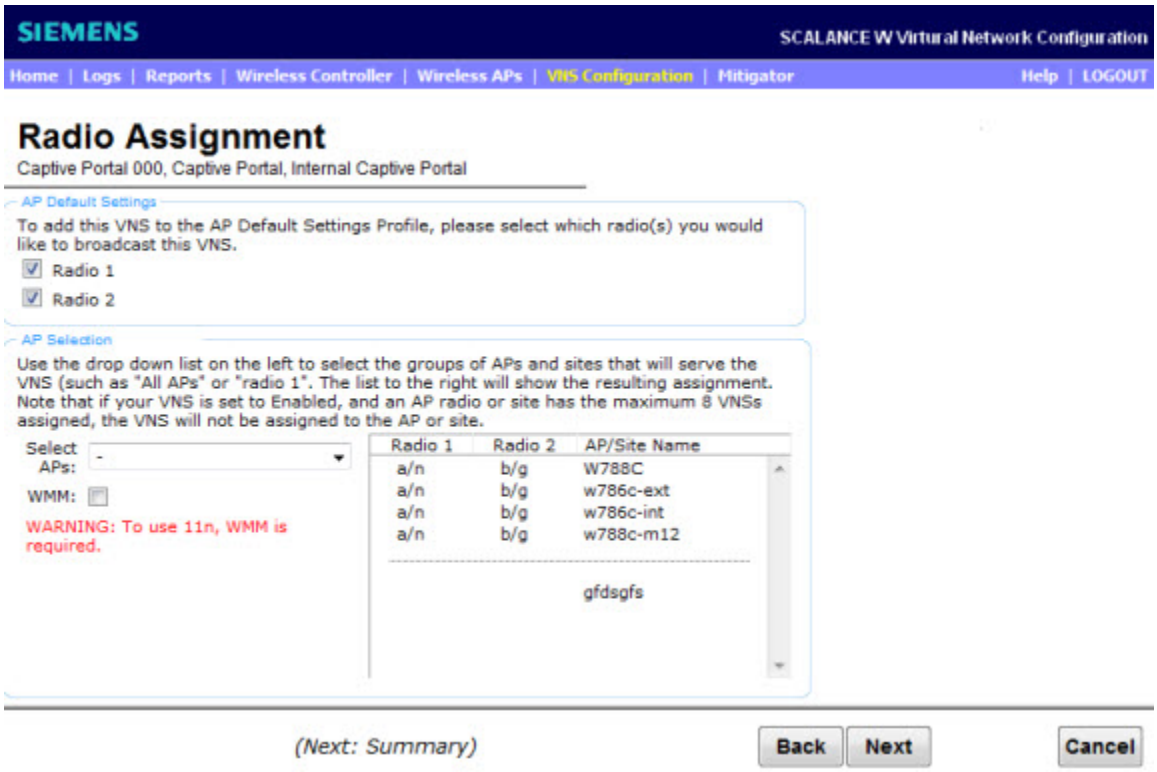
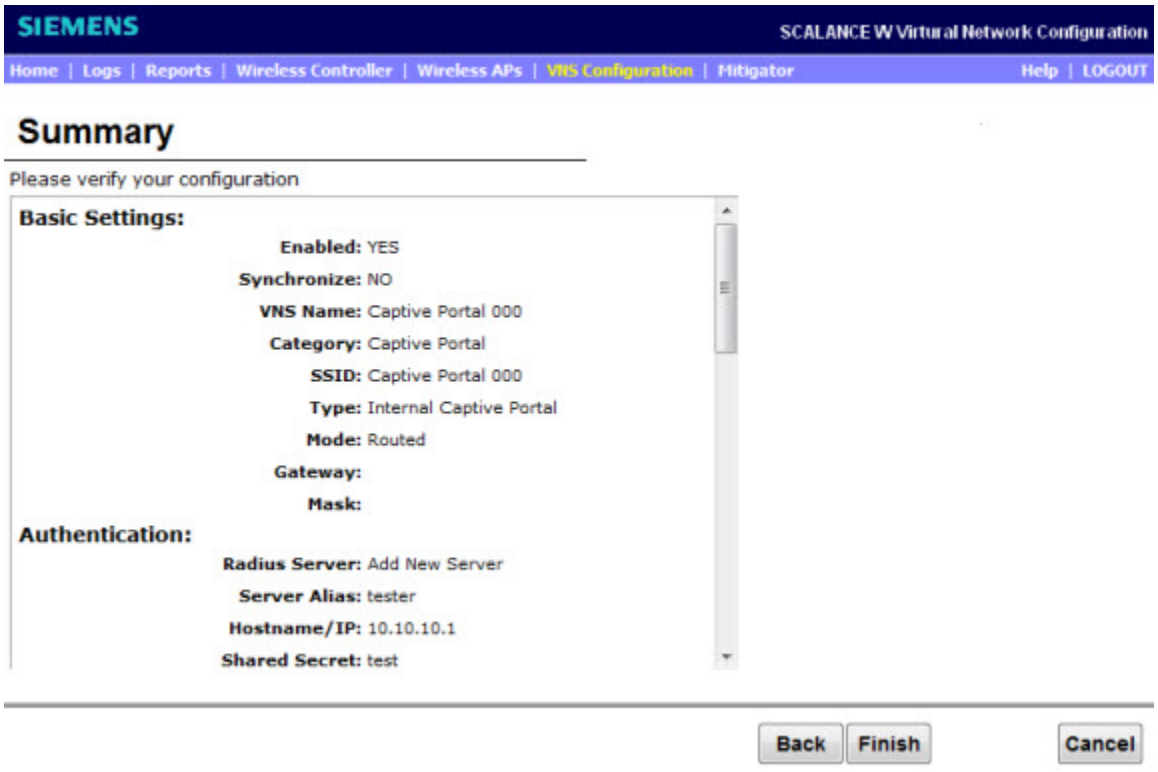

SIEMENS
SCALANCE W Virtual Network Configuration
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
Radio Assignment
Captive Portal 000, Captive Portal, Internal Captive Portal
AP Default Settings
To add this VNS to the AP Default Settings Profile, please select which radio(s) you would like to broadcast this VNS.
Radio 1
Radio 2
AP Selection
Use the drop down list on the left to select the groups of APs and sites that will serve the VNS (such as "All APs" or "radio 1". The list to the right will show the resulting assignment. Note that if your VNS is set to Enabled, and an AP radio or site has the maximum 8 VNSs assigned, the VNS will not be assigned to the AP or site.
Select APs:
WMM:
WARNING: To use 11n, WMM is required.
Radio 1
Radio 2
AP/Site Name
a/n b/g W788C
a/n b/g w786c-ext
a/n b/g w786c-int
a/n b/g w788c-m12
gfdsgfs
(Next: Summary)
Back
Next
Cancel

Table 7-14 Captive Portal Radio Assignment Page - Fields and Buttons

Field/Button	Description
AP Default Settings	
Radio 1 / Radio 2	Select the radios of the AP default settings profile that you want to broadcast the Captive Portal VNS.
AP Selection	
Select APs	Select the group of APs that will broadcast the Captive Portal VNS: • **all radios** — Click to assign all of the APs' radios. • **radio 1** — Click to assign only the APs' Radio 1. • **radio 2**— Click to assign only the APs' Radio 2. • **local APs - all radios** — Click to assign only the local APs. • **local APs - radio 1** — Click to assign only the local APs' Radio 1. • **local APs - radio 2** — Click to assign only the local APs' Radio 2. • **foreign APs - all radios** — Click to assign only the foreign APs. • **foreign APs - radio 1** — Click to assign only the foreign APs' Radio 1. • **foreign APs - radio 2** — Click to assign only the foreign APs' Radio 2.
WMM	(Wi-Fi Multimedia), if enabled on an individual VNS, provides multimedia enhancements that improve the user experience for audio, video, and voice applications. WMM is part of the 802.11e standard for QoS. If enabled, the AP will accept WMM client associations, and will classify and prioritize the downlink traffic for all WMM clients. WMM clients will also classify and prioritize the uplink traffic.

12. Click **Next**. The **Summary** screen is displayed.



13. Confirm your data VNS configuration. To revise your configuration, click **Back**.
14. To create your VNS, click **Finish**, and then click **Close**.
15. If applicable, you can continue to configure or edit the new VNS by clicking the individual VNS configuration tabs.

Creating an External Captive Portal VNS

To configure an external Captive Portal VNS using the VNS wizard:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, expand the New pane, then click **START VNS WIZARD**. The **VNS Creation Wizard** screen is displayed.
3. In the **Name** box, type a name for the Captive Portal VNS.

4. In the **Category** drop-down list, click **Captive Portal**, and then click **Next**. The **Basic Settings** screen is displayed.

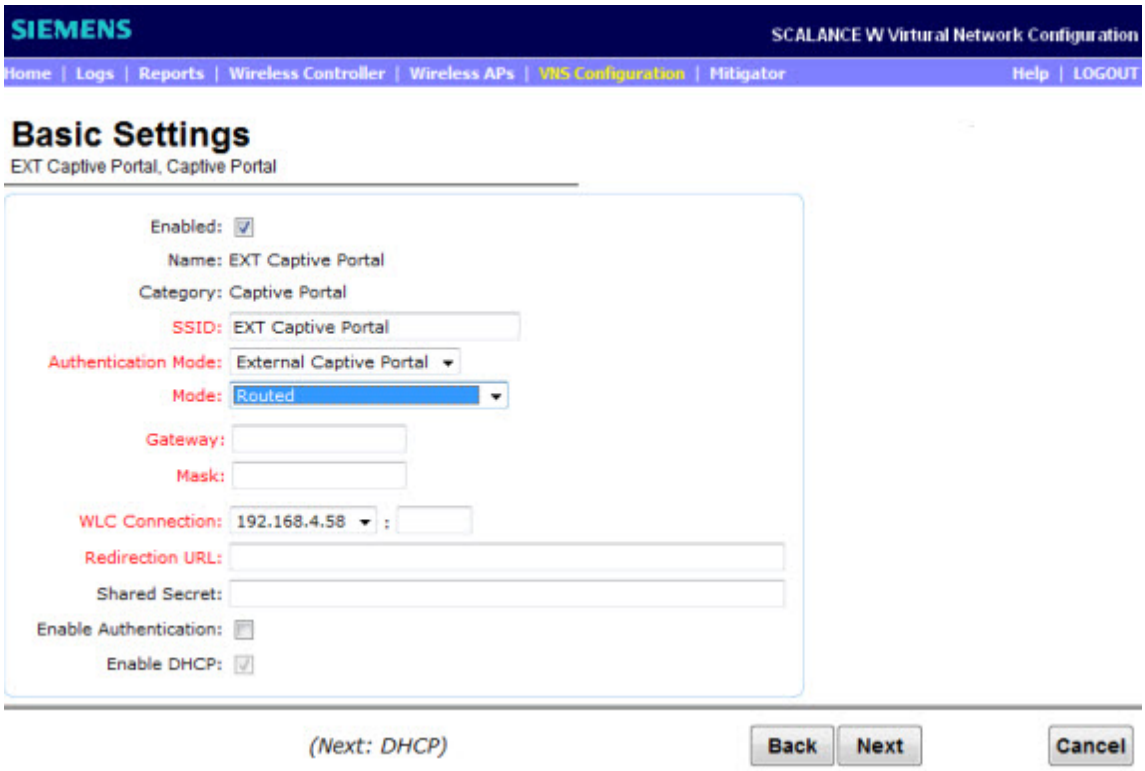


Table 7-15 External Captive Portal Basic Settings Page - Fields and Buttons

Field/Button	Description
Enabled	By default, the **Enabled** checkbox for the new VNS is enabled. A VNS must be enabled for it to be able to provide service for mobile user traffic.
Name	Identifies the name of the VNS.
Category	Identifies the VNS category.
SSID	Identifies the SSID assigned to the VNS.
Authentication Mode	Click **External Captive Portal**
Mode	Click the VNS Mode you want to assign: **Routed** is a VNS type where user traffic is tunneled to the SCALANCE IWLAN Controller. **Bridge Traffic Locally at WLC** is a VNS type where user traffic is tunneled to the SCALANCE IWLAN Controller and is directly bridged at the controller to a specific VLAN. With this VNS type, mobile users become a natural extension of a VLAN subnet. For each Bridge Traffic Locally at WLC VNS that is created, a VLAN needs to be specified. In addition, the network port on which the VLAN is assigned must be configured on the switch, and the corresponding SCALANCE IWLAN Controller interface must match the correct VLAN.

Table 7-15 External Captive Portal Basic Settings Page - Fields and Buttons (continued)

Field/Button	Description
Routed External Captive Portal	
Gateway	**Gateway** — Type the SCALANCE IWLAN Controller's own IP address in that VNS. This IP address is the default gateway for the VNS. The SCALANCE IWLAN Controller advertises this address to the wireless devices when they sign on. For routed VNSs, it corresponds to the IP address that is communicated to mobile users (in the VNS) as the default gateway for the VNS subnet. (Mobile users target the SCALANCE IWLAN Controller's interface in their effort to route packets to an external host).
Mask	Type the appropriate subnet mask for this IP address to separate the network portion from the host portion of the address (typically 255.255.255.0).
HWC Connection	Click the SCALANCE IWLAN Controller IP address. Also type the port of the SCALANCE IWLAN Controller in the accompanying box. If there is an authentication server configured for this VNS, the external Captive Portal page on the external authentication server will send the re0quest back to the SCALANCE IWLAN Controller to allow the SCALANCE IWLAN Controller to continue with the RADIUS authentication and filtering.
Redirection URL	Type the URL to which the wireless device user will be directed to after authentication.
Shared Secret	Type the password that is common to both the SCALANCE IWLAN Controller and the external Web server if you want to encrypt the information passed between the SCALANCE IWLAN Controller and the external Web server.
Enable Authentication	By default, this option is selected if the **VNS Type** is **External Captive Portal**, which enables authentication for the new Captive Portal VNS.
Enable DHCP	By default, this option is selected if the **VNS Type** is **External Captive Portal**, which enables DHCP services for the new Captive Portal VNS.
HWC External Captive Portal VNS	
Interface	Click the physical interface that provides the access to the VLAN.
Interface IP address	Type the IP address of the SCALANCE IWLAN Controller’s interface on the VLAN.
Mask	Type the appropriate subnet mask for this IP address to separate the network portion from the host portion of the address (typically 255.255.255.0).
VLAN ID	Type the VLAN tag to which the SCALANCE IWLAN Controller will be bridged for the VNS.

Table 7-15 External Captive Portal Basic Settings Page - Fields and Buttons (continued)

Field/Button	Description
HWC Connection	Click the SCALANCE IWLAN Controller IP address. Also type the port of the SCALANCE IWLAN Controller in the accompanying box. If there is an authentication server configured for this VNS, the external Captive Portal page on the external authentication server will send the request back to the SCALANCE IWLAN Controller to allow the SCALANCE IWLAN Controller to continue with the RADIUS authentication and filtering.
Redirection URL	Type the URL to which the wireless device user will be directed to after authentication.
Shared Secret	Type the password that is common to both the SCALANCE IWLAN Controller and the external Web server if you want to encrypt the information passed between the SCALANCE IWLAN Controller and the external Web server.
Enable Authentication	By default, this option is selected if the **VNS Type** is **External Captive Portal**, which enables authentication for the new Captive Portal VNS.
Enable DHCP	If applicable, select this checkbox to enable DHCP authentication for the new Captive Portal VNS.

5. Click **Next**. The VNS wizard displays the appropriate configuration screens, depending on your selection of the **Enable Authentication** and **Enable DHCP** checkboxes.

Table 7-16 External Captive Portal Authentication Page - Fields and Buttons

Field/Button	Description
Radius Server	Click the RADIUS server you want to assign to the new Captive Portal VNS, or click **Add New Server** and then do the following
Server Alias	Type a name you want to assign to the new RADIUS server.
Hostname/IP	Type either the RADIUS server's FQDN (fully qualified domain name) or IP address.
Shared Secret	Type the password that will be used to validate the connection between the SCALANCE IWLAN Controller and the RADIUS server.
Mask/Unmask	Click to display or hide your shared secret key.
Roles	Select the authentication role options for the RADIUS server: **Authentication** — By default, this option is selected if the **VNS Type** is **External Captive Portal**, which enables the RADIUS server to perform authentication on the Captive Portal VNS. **MAC-based Authentication** — Select to enable the RADIUS server to perform MAC-based authentication on the Captive Portal VNS. If the **MAC-based authentication** option is enabled, select to enable **MAC-based authorization on roam**, if applicable. **Accounting** — Select to enable the RADIUS server to perform accounting on the Captive Portal VNS.

6. Click **Next**. The **DHCP** screen is displayed.

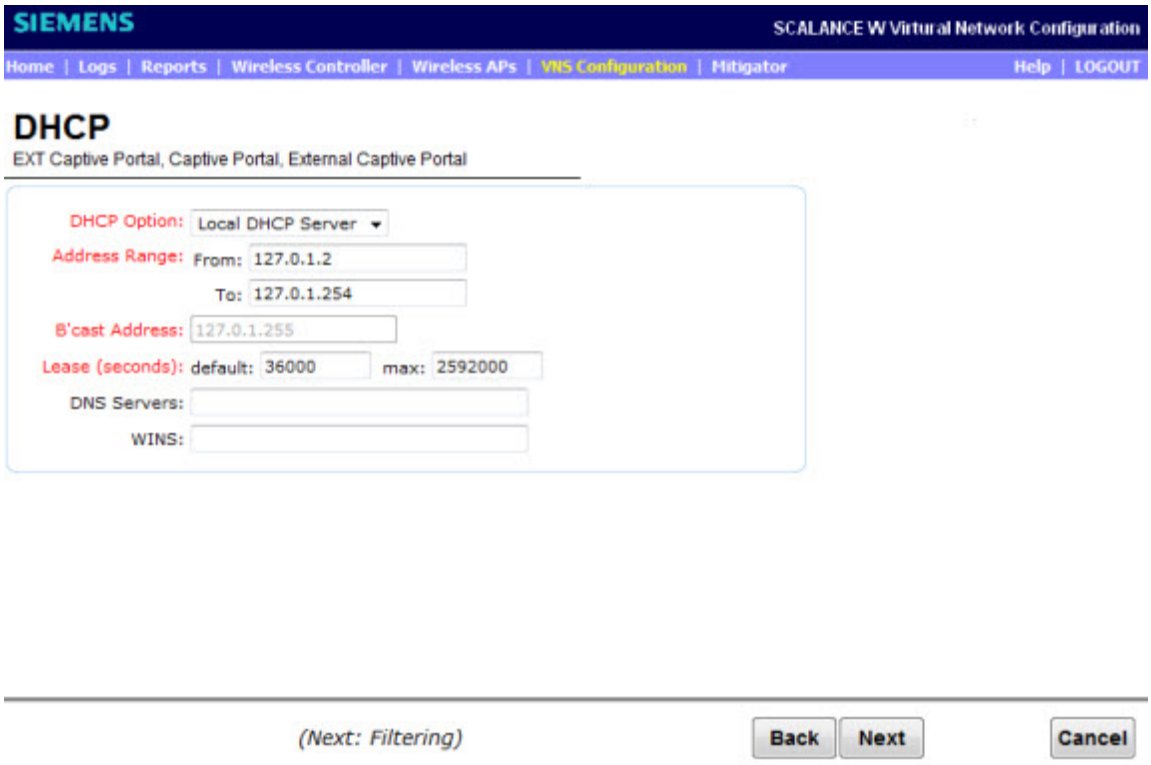
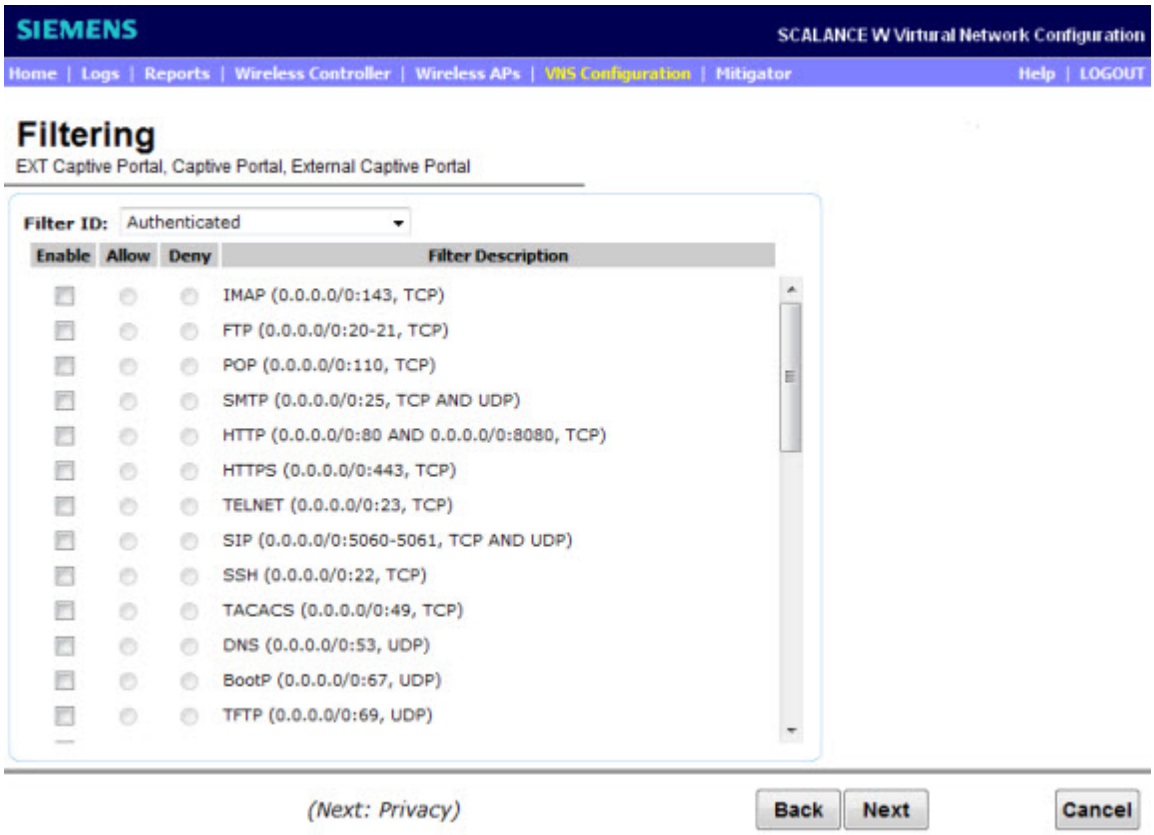


Table 7-17 External Captive Portal DHCP Page - Fields and Buttons

Field/Button	Description
DHCP Option	In the **DHCP Option** drop-down list, click one of the following: **Use DHCP Relay** — Using DHCP relay forces the SCALANCE IWLAN Controller to forward DHCP requests to an external DHCP server on the enterprise network. DHCP relay bypasses the local DHCP server for the SCALANCE IWLAN Controller and allows the enterprise to manage IP address allocation to a VNS from its existing infrastructure. **DHCP Servers** — If **Use DHCP Relay** was selected, type the IP address of the DHCP server to which DHCP discover and request messages will be forwarded for clients on this VNS. The SCALANCE IWLAN Controller does not handle DHCP requests from users, but instead forwards the requests to the indicated DHCP server. The DHCP server must be configured to match the VNS settings. In particular for a Routed VNS, the DHCP server must identify the SCALANCE IWLAN Controller's interface IP as the default Gateway (router) for the subnet. (Users intending to reach devices outside of the subnet will forward the packets to the default gateway (controller) for delivery upstream.) **Local DHCP Server** — If applicable, edit the local DHCP server settings.
DNS Server	Type the IP Address of the Domain Name Servers to be used.
WINS	Type the IP address if the DHCP server uses Windows Internet Naming Service (WINS).

7. Click **Next**. The **Filtering** screen is displayed.



8. On the **Filtering** screen, do the following:
   - In the **Filter ID** drop-down list, click one of the following:
     - **Default** — Controls access if there is no matching filter ID for a user.
     - **Exception** — Protects access to the SCALANCE IWLAN Controller's own interfaces, including the VNSs own interface. VNS exception filters are applied to user traffic intended for the SCALANCE IWLAN Controller's own interface point on the VNS. These filters are applied after the user's specific VNS state assigned filters.
     - **Non-Authenticated** — Controls network access and also used to direct mobile users to a Captive Portal Web page for login.
9. In the **Filter** table, select the **Allow** or **Deny** option buttons for each filter if applicable, and then select the **Enable** checkbox accordingly.

10. Click **Next**. The **Privacy** screen is displayed.

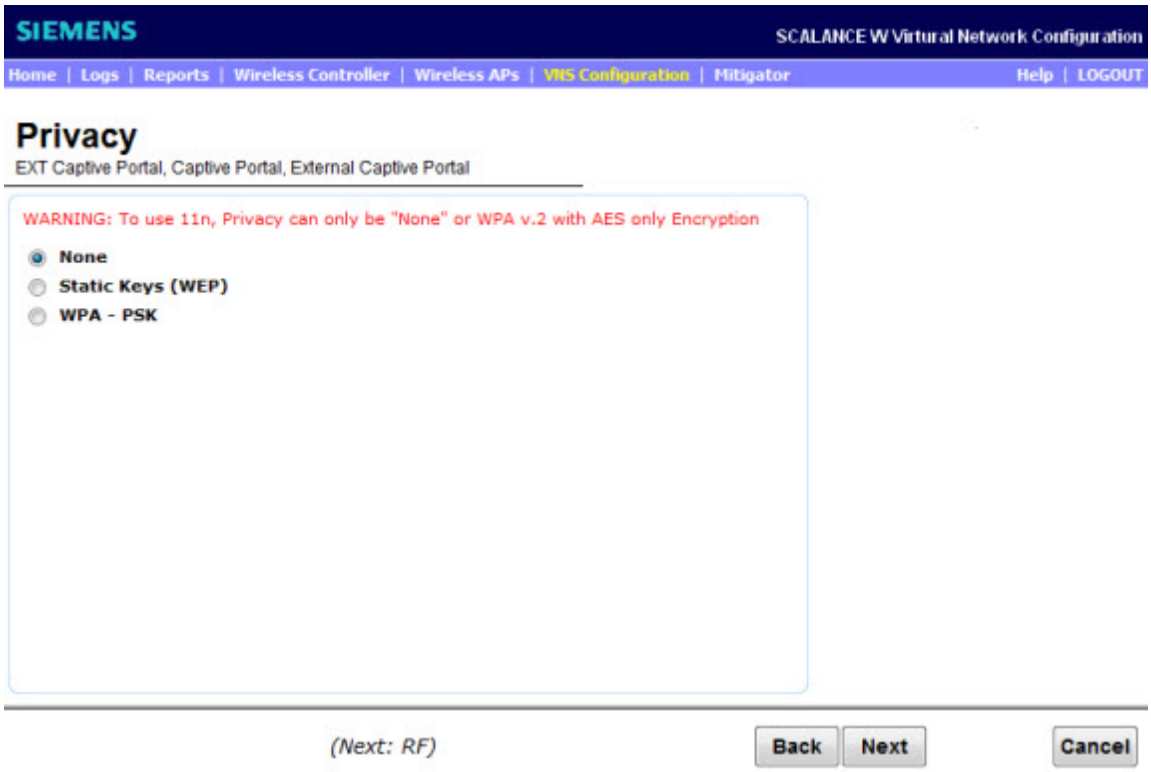

SIEMENS
SCALANCE W Virtural Network Configuration
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
Privacy
EXT Captive Portal, Captive Portal, External Captive Portal
WARNING: To use 11n, Privacy can only be "None" or WPA v.2 with AES only Encryption
None
Static Keys (WEP)
WPA - PSK
(Next: RF)
Back
Next
Cancel

Table 7-18 External Captive Portal Privacy Page - Fields and Buttons

Field/Button	Description
None	Select if you do not want to assign any privacy mechanism.
Static Keys (WEP)	Select to configure static keys. Then enter: **WEP Key Index** — Click the WEP encryption key index: **1**, **2**, **3**, or **4**. **Note:** Specifying the WEP key index is supported only for W78xC Wireless APs. **WEP Key Length** — Click the WEP encryption key length: **64 bit**, **128 bit**, or **152 bit**. Select an **Input Method**: **Input Hex** — type the WEP key input in the WEP Key box. The key is generated automatically based on the input. **Input String** — type the secret WEP key string used for encrypting and decrypting in the **WEP Key String** box. The **WEP Key** box is automatically filled by the corresponding Hex code.

Table 7-18 External Captive Portal Privacy Page - Fields and Buttons (continued)

Field/Button	Description
WPA-PSK	Select to use a Pre-Shared Key (PSK), or shared secret for authentication. WPA-PSK (Wi-Fi Protected Access Pre-Shared key) is a security solution that adds authentication to enhanced WEP encryption and key management. WPA-PSK mode does not require an authentication server. It is suitable for home or small office. To enable WPA v1 encryption, select **WPA v.1**. In the **Encryption** drop-down list, select one of the following encryption types: **Auto** — The Wireless AP will advertise both TKIP and CCMP (Counter Mode with Cipher Block Chaining Message Authentication Code Protocol) for WPAv1. CCMP is an IEEE 802.11i encryption protocol that uses the encryption cipher AES (Advanced Encryption Standard). **TKIP only** — The AP will advertise TKIP as an available encryption protocol for WPAv1. It will not advertise CCMP. To enable WPA v2 encryption, select **WPA v.2**. In the **Encryption** drop-down list, click one of the following encryption types: **Auto** — The AP advertises both TKIP and CCMP (counter mode with cipher block chaining message authentication code protocol). CCMP is an IEEE 802.11i encryption protocol that uses the encryption cipher AES (Advanced Encryption Standard). **AES only** — The AP advertises CCMP as an available encryption protocol. It will not advertise TKIP. To enable re-keying after a time interval, select **Broadcast re-key interval**. If this checkbox is not selected, the Broadcast encryption key is never changed and the Wireless AP will always use the same broadcast key for Broadcast/Multicast transmissions. This will reduce the level of security for wireless communications. In the **Broadcast re-key interval** box, type the time interval after which the broadcast encryption key is changed automatically. To enable the group key power save retry, select **Group Key Power Save Retry**. **Note:** The group key power save retry is supported only for W78xC Wireless APs. In the **Pre-shared key** box, type the shared secret key to be used between the wireless device and Wireless AP. The shared secret key is used to generate the 256-bit key. **Mask/Unmask** — Click to display or hide your shared secret key.

11. Click **Next**. The **Radio Assignment** screen is displayed.

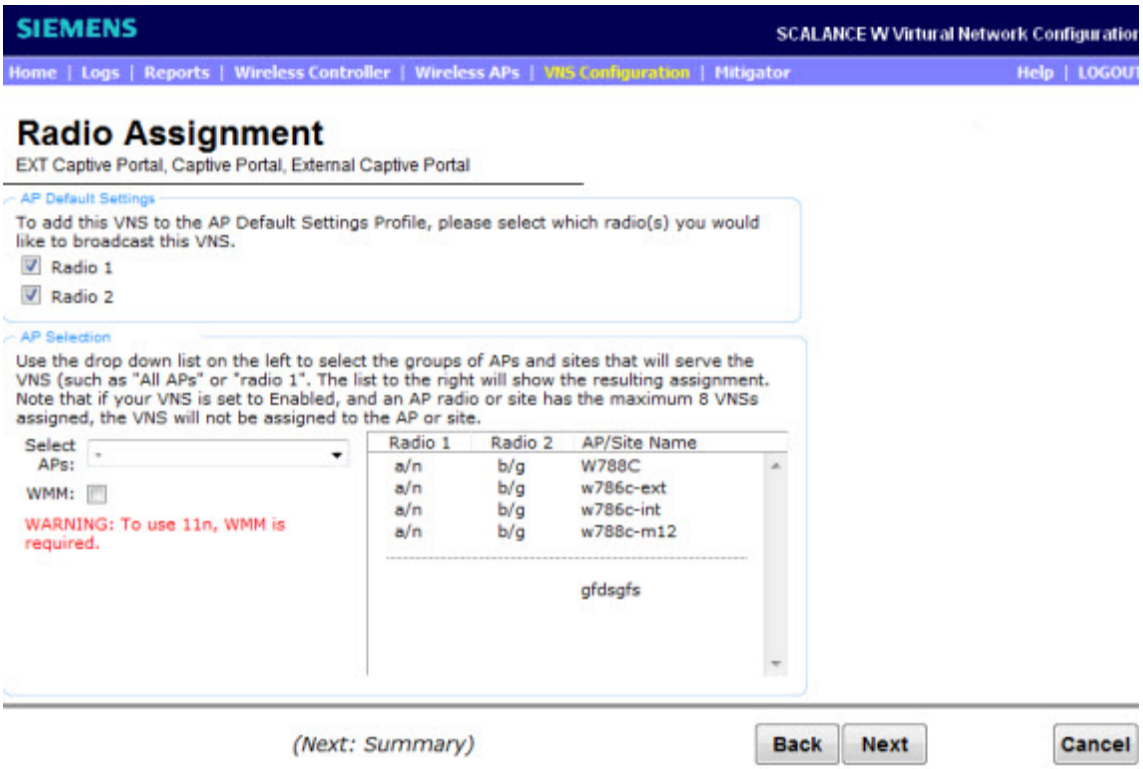

SIEMENS
SCALANCE W Virtural Network Configuratio
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
Radio Assignment
EXT Captive Portal, Captive Portal, External Captive Portal
AP Default Settings
To add this VNS to the AP Default Settings Profile, please select which radio(s) you would like to broadcast this VNS.
Radio 1
Radio 2
AP Selection
Use the drop down list on the left to select the groups of APs and sites that will serve the VNS (such as "All APs" or "radio 1". The list to the right will show the resulting assignment. Note that if your VNS is set to Enabled, and an AP radio or site has the maximum 8 VNSs assigned, the VNS will not be assigned to the AP or site.
Select APs:
WMM:
WARNING: To use 11n, WMM is required.
Radio 1
Radio 2
AP/Site Name
a/n b/g W788C
a/n b/g w786c-ext
a/n b/g w786c-int
a/n b/g w788c-m12
gfdsgfs
(Next: Summary)
Back
Next
Cancel

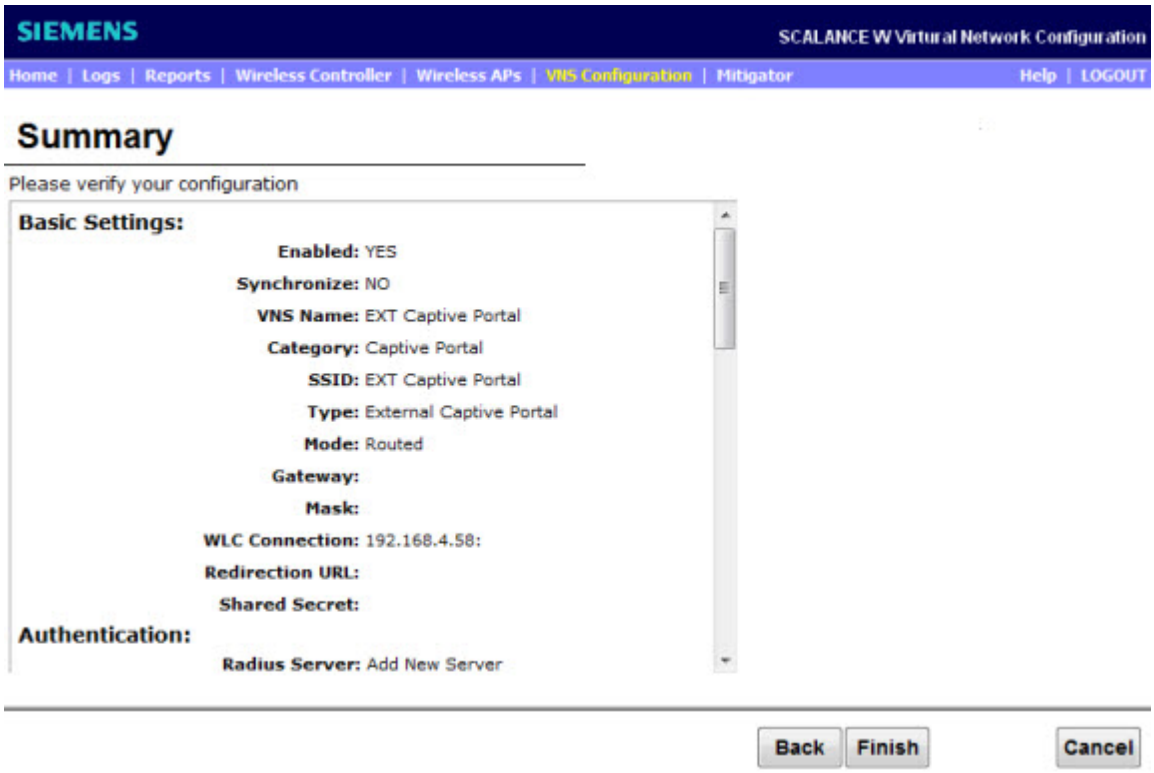
Table 7-19 External Captive Portal Radio Assignment Page - Fields and Buttons

Field/Button	Description
AP Default Settings	
Radio 1 / Radio 2	Select the radios of the AP default settings profile that you want to broadcast the Captive Portal VNS.
AP Selection	
Select APs	Select the group of APs that will broadcast the Captive Portal VNS: • **all radios** — Click to assign all of the APs' radios. • **radio 1** — Click to assign only the APs' Radio 1. • **radio 2**— Click to assign only the APs' Radio 2. • **local APs - all radios** — Click to assign only the local APs. • **local APs - radio 1** — Click to assign only the local APs' Radio 1. • **local APs - radio 2** — Click to assign only the local APs' Radio 2. • **foreign APs - all radios** — Click to assign only the foreign APs. • **foreign APs - radio 1** — Click to assign only the foreign APs' Radio 1. • **foreign APs - radio 2** — Click to assign only the foreign APs' Radio 2.

Table 7-19 External Captive Portal Radio Assignment Page - Fields and Buttons

Field/Button	Description
WMM	(Wi-Fi Multimedia), if enabled on an individual VNS, provides multimedia enhancements that improve the user experience for audio, video, and voice applications. WMM is part of the 802.11e standard for QoS. If enabled, the AP will accept WMM client associations, and will classify and prioritize the downlink traffic for all WMM clients. WMM clients will also classify and prioritize the uplink traffic.

12. Click **Next**. The **Summary** screen is displayed.



13. Confirm your data VNS configuration. To revise your configuration, click **Back**.
14. To create your VNS, click **Finish**, and then click **Close**.
15. If applicable, you can continue to configure or edit the new VNS by clicking the individual VNS configuration tabs.

Creating a GuestPortal VNS

A GuestPortal provides wireless device users with temporary guest network services. A GuestPortal is serviced by a GuestPortal-dedicated VNS. An SCALANCE IWLAN Controller is allowed only one GuestPortal-dedicated VNS at a time. GuestPortal user accounts are administered by a GuestPortal manager. A GuestPortal manager is a login group — GuestPortal managers must have their accounts created for them on the SCALANCE IWLAN Controller. For more information, see "Working with GuestPortal Administration" on page 19-1

The GuestPortal VNS is a Captive Portal authentication-based VNS that uses a database on the SCALANCE IWLAN Controller for managing user accounts. The database is administered through a simple, user-friendly graphic user interface that can be used by non-technical staff.

The GuestPortal VNS can be a Routed or a Bridge Traffic Locally at the WLC VNS, with SSID-based network assignment. The GuestPortal VNS is a simplified VNS. It does not support the following:

- RADIUS authentication or accounting
- MAC-based authorization
- Child VNS support

The GuestPortal VNS can be created as a new VNS or can be configured from an already existing VNS. When you create a new VNS using the VNS wizard, you configure the VNS in the following stages:

- Basic settings
- DHCP settings
- Filter settings
- Privacy settings
- Radio assignment settings
- Summary

Use the following high-level description to set up a GuestPortal on your system:

1. Create a GuestPortal VNS.

   The GuestPortal VNS can be created as a new VNS or can be configured from an already existing VNS.

2. Configure the GuestPortal ticket.

   A GuestPortal account ticket is a print-ready form that displays the guest account information, system requirements, and instructions on how to log on to the guest account. For more information, see "Working with the GuestPortal Ticket Page" on page 19-12.

3. Configure availability, if applicable.

   Availability maintains service availability in the event of a SCALANCE IWLAN Controller outage. For more information, see Chapter 12, **Availability and Session Availability**.

4. Create GuestPortal manager and user accounts.

   For more information, see "Working with GuestPortal Administration" on page 19-1

5. Manage your guest accounts and GuestPortal logs.

   For more information, see the SCALANCE WLC711 *Maintenance Guide.*

The GuestPortal VNS can be created as a new VNS or can be configured from an already existing VNS. A SCALANCE IWLAN Controller is allowed only **one** GuestPortal-dedicated VNS at a time.

To Create a GuestPortal VNS from an Already Existing VNS:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, select and expand the **Virtual Networks** pane.
3. Click on the VNS you want to configure as a GuestPortal VNS. The VNS configuration window **Core** tab is displayed.
4. Select a preconfigured WLAN Service and click **Edit**, or press **New** to create a new WLAN Service.

5. In the Edit WLAN Service window, click the **Auth & Acct tab.**
6. In the **Authentication Mode** drop-down list, click **GuestPortal**.
7. To save your changes, click **Save**.

To Create a New GuestPortal VNS Using the VNS Wizard:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, expand the **New** pane, then click **START VNS WIZARD**. The **VNS Creation Wizard** screen is displayed.
3. In the **Name** box, type a name for the GuestPortal VNS.
4. In the **Category** drop-down list, click **Captive Portal**, and then click **Next**. The **Basic Settings** screen is displayed.

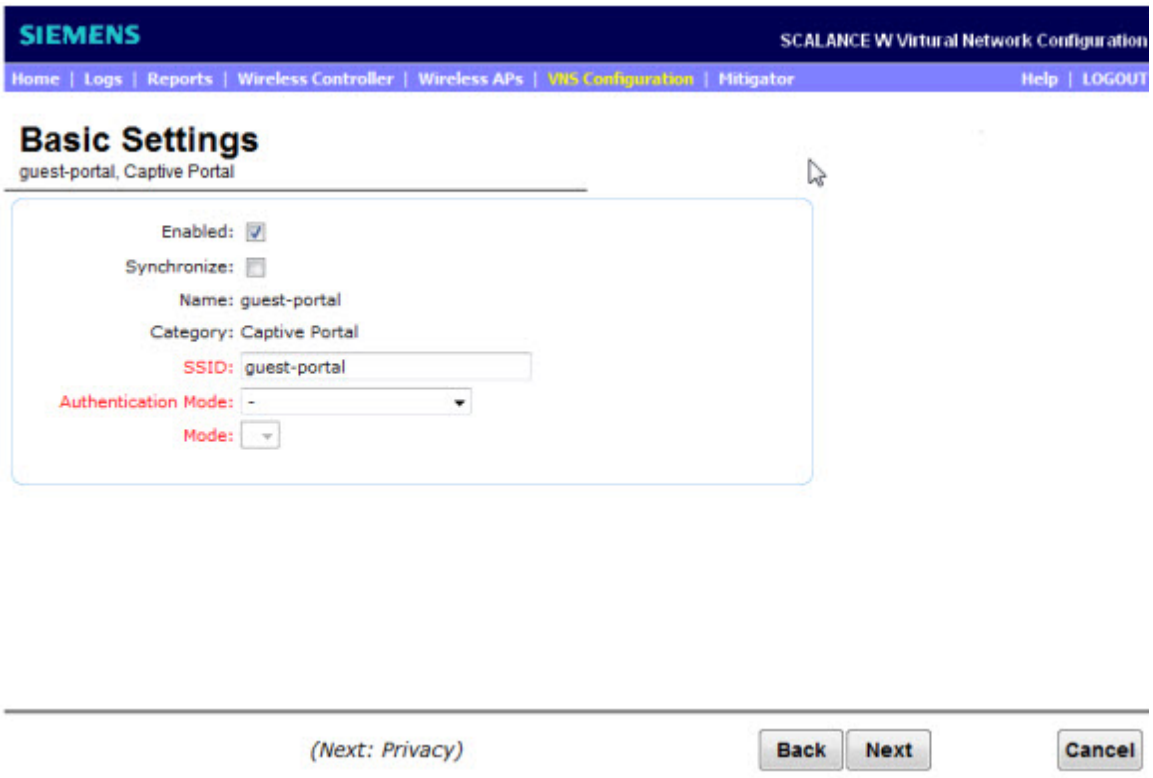


Table 7-20 Guest Portal Basic Settings Page - Fields and Buttons

Field/Button	Description
Enabled	By default, the **Enabled** checkbox for the new VNS is enabled. A VNS must be enabled for it to be able to provide service for mobile user traffic.
Synchronize	By default, the **Synchronize** checkbox for the new VNS is disabled.
Name	Identifies the name of the VNS.
Category	Identifies the VNS category.

Table 7-20 Guest Portal Basic Settings Page - Fields and Buttons (continued)

Field/Button	Description
SSID	Identifies the SSID assigned to the VNS.
Authentication Mode	Click **Guest Portal**
Mode	Click the VNS Mode you want to assign: **Routed** is a VNS type where user traffic is tunneled to the SCALANCE IWLAN Controller. **Bridge Traffic Locally at WLC** is a VNS type where user traffic is tunneled to the SCALANCE IWLAN Controller and is directly bridged at the controller to a specific VLAN. With this VNS type, mobile users become a natural extension of a VLAN subnet. For each Bridge Traffic Locally at WLC VNS that is created, a VLAN needs to be specified. In addition, the network port on which the VLAN is assigned must be configured on the switch, and the corresponding SCALANCE IWLAN Controller interface must match the correct VLAN.
Routed	
Gateway	**Gateway** — Type the SCALANCE IWLAN Controller's own IP address in that VNS. This IP address is the default gateway for the VNS. The SCALANCE IWLAN Controller advertises this address to the wireless devices when they sign on. For routed VNSs, it corresponds to the IP address that is communicated to mobile users (in the VNS) as the default gateway for the VNS subnet. (Mobile users target the SCALANCE IWLAN Controller's interface in their effort to route packets to an external host).
Mask	Type the appropriate subnet mask for this IP address to separate the network portion from the host portion of the address (typically 255.255.255.0).
Bridge Traffic Locally at WLC	
Interface	Click the physical interface that provides the access to the VLAN.
Interface IP address	Type the IP address of the SCALANCE IWLAN Controller’s interface on the VLAN.
Mask	Type the appropriate subnet mask for this IP address to separate the network portion from the host portion of the address (typically 255.255.255.0).
VLAN ID	Type the VLAN to which the SCALANCE IWLAN Controller will be bridged for the VNS. Then, select either **Untagged** or **Tagged**.
Enable DHCP	If applicable, select this checkbox to enable DHCP.

5. Click **Next**. The **DHCP** screen is displayed. If DHCP is disabled, continue with step 6 on page 7-66

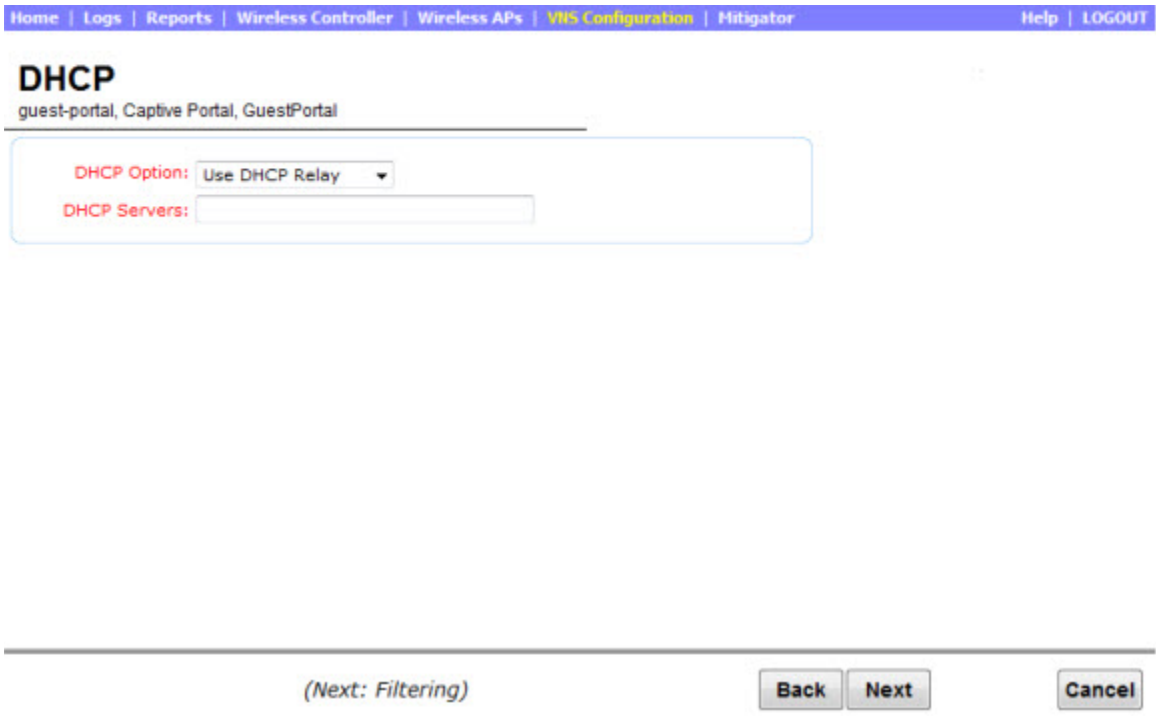


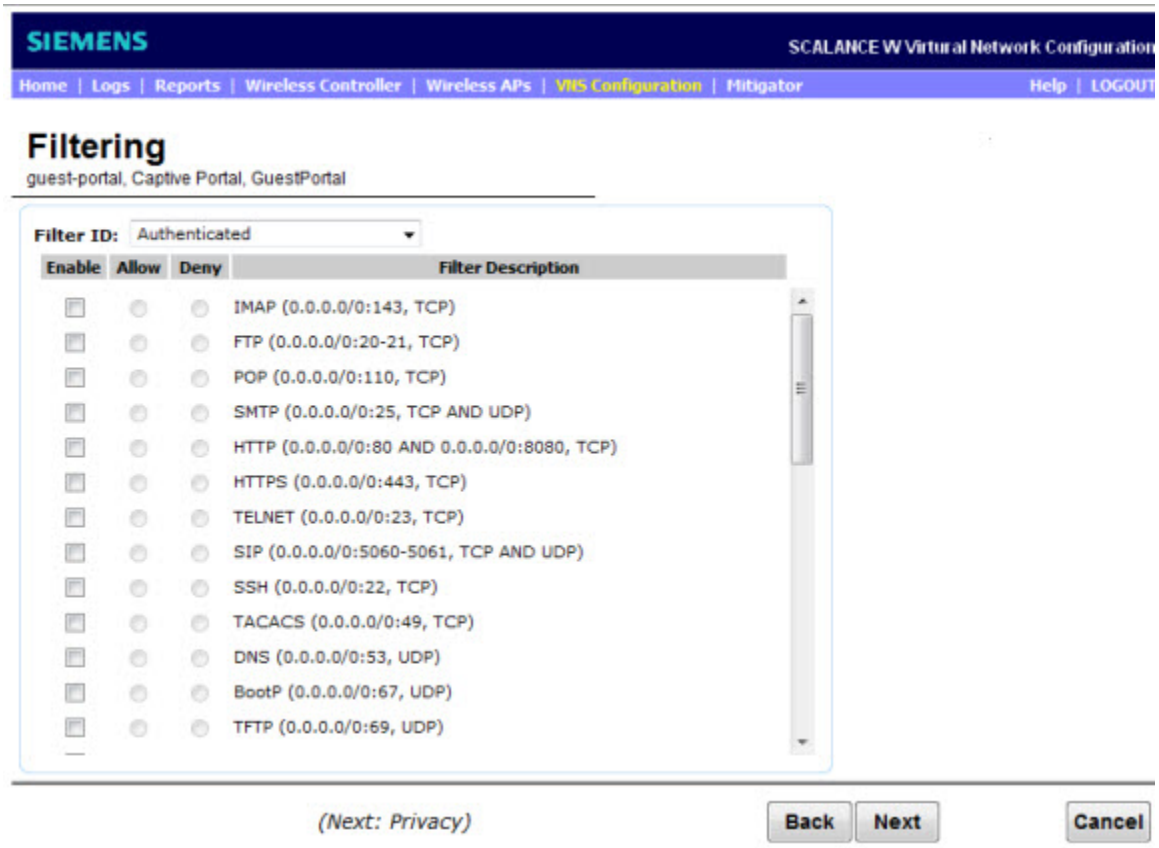
Table 7-21 Guest Portal DHCP Page - Fields and Buttons

Field/Button	Description
DHCP Option	In the **DHCP Option** drop-down list, click one of the following: **Use DHCP Relay** — Using DHCP relay forces the SCALANCE IWLAN Controller to forward DHCP requests to an external DHCP server on the enterprise network. DHCP relay bypasses the local DHCP server for the SCALANCE IWLAN Controller and allows the enterprise to manage IP address allocation to a VNS from its existing infrastructure. **DHCP Servers** — If **Use DHCP Relay** was selected, type the IP address of the DHCP server to which DHCP discover and request messages will be forwarded for clients on this VNS. The SCALANCE IWLAN Controller does not handle DHCP requests from users, but instead forwards the requests to the indicated DHCP server. The DHCP server must be configured to match the VNS settings. In particular for a Routed VNS, the DHCP server must identify the SCALANCE IWLAN Controller's interface IP as the default Gateway (router) for the subnet. (Users intending to reach devices outside of the subnet will forward the packets to the default gateway (controller) for delivery upstream.) **Local DHCP Server** — If applicable, edit the local DHCP server settings.
DNS Server	Type the IP Address of the Domain Name Servers to be used.

Table 7-21 Guest Portal DHCP Page - Fields and Buttons

Field/Button	Description
WINS	Type the IP address if the DHCP server uses Windows Internet Naming Service (WINS).

6. Click **Next**. The **Filtering** screen is displayed.



7. Configure the VNS filtering settings:
8. In the **Filter ID** drop-down list, click one of the following:
   - **Authenticated** — Controls network access after the user has been authenticated.
   - **Non-authenticated** — Controls network access and to direct users to a Captive Portal Web page for login.
9. In the **Filter** table, select the **Enable** checkbox for the desired filters, then select the **Allow** or **Deny** option buttons for each filter as needed.
10. At the bottom of the Filter list, select **Allow** or **Deny** for **All Other Traffic**.

11. Click **Next**. The **Privacy** screen is displayed.

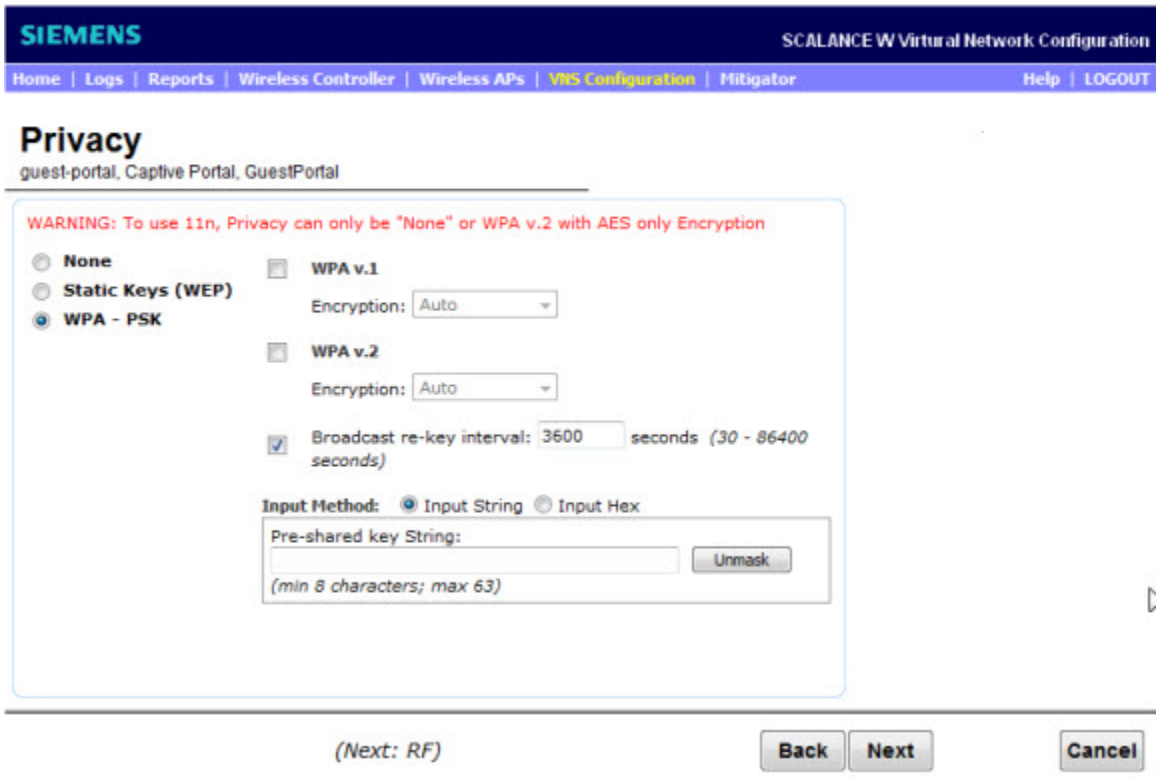


Table 7-22 Guest Portal Privacy Page - Fields and Buttons

Field/Button	Description
None	Select if you do not want to assign any privacy mechanism.
Static Keys (WEP)	Select to configure static keys. Then enter: **WEP Key Index** — Click the WEP encryption key index: **1**, **2**, **3**, or **4**. **Note:** Specifying the WEP key index is supported only for W78xC Wireless APs. **WEP Key Length** — Click the WEP encryption key length: **64 bit**, **128 bit**, or **152 bit**. Select an **Input Method**: **Input Hex** — type the WEP key input in the WEP Key box. The key is generated automatically based on the input. **Input String** — type the secret WEP key string used for encrypting and decrypting in the **WEP Key String** box. The **WEP Key** box is automatically filled by the corresponding Hex code.

Table 7-22 Guest Portal Privacy Page - Fields and Buttons (continued)

Field/Button	Description
WPA-PSK	Select to use a Pre-Shared Key (PSK), or shared secret for authentication. WPA-PSK (Wi-Fi Protected Access Pre-Shared key) is a security solution that adds authentication to enhanced WEP encryption and key management. WPA-PSK mode does not require an authentication server. It is suitable for home or small office. To enable WPA v1 encryption, select **WPA v.1**. In the **Encryption** drop-down list, select one of the following encryption types: **Auto** — The Wireless AP will advertise both TKIP and CCMP (Counter Mode with Cipher Block Chaining Message Authentication Code Protocol) for WPAv1. CCMP is an IEEE 802.11i encryption protocol that uses the encryption cipher AES (Advanced Encryption Standard). **TKIP only** — The AP will advertise TKIP as an available encryption protocol for WPAv1. It will not advertise CCMP. To enable WPA v2 encryption, select **WPA v.2**. In the **Encryption** drop-down list, click one of the following encryption types: **Auto** — The AP advertises both TKIP and CCMP (counter mode with cipher block chaining message authentication code protocol). CCMP is an IEEE 802.11i encryption protocol that uses the encryption cipher AES (Advanced Encryption Standard). **AES only** — The AP advertises CCMP as an available encryption protocol. It will not advertise TKIP. To enable re-keying after a time interval, select **Broadcast re-key interval**. If this checkbox is not selected, the Broadcast encryption key is never changed and the Wireless AP will always use the same broadcast key for Broadcast/Multicast transmissions. This will reduce the level of security for wireless communications. In the **Broadcast re-key interval** box, type the time interval after which the broadcast encryption key is changed automatically. To enable the group key power save retry, select **Group Key Power Save Retry**. **Note:** The group key power save retry is supported only for W78xC Wireless APs. In the **Pre-shared key** box, type the shared secret key to be used between the wireless device and Wireless AP. The shared secret key is used to generate the 256-bit key. **Mask/Unmask** — Click to display or hide your shared secret key.

12. Click **Next**. The **Radio Assignment** screen is displayed.

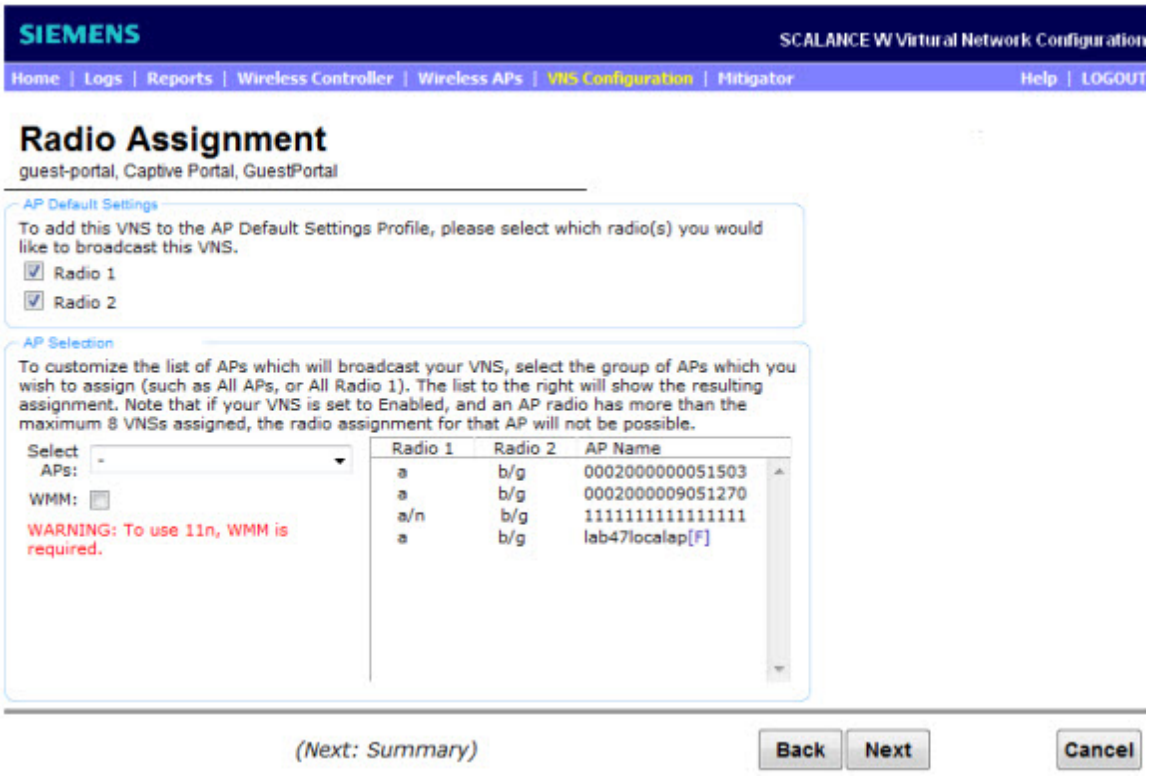

SIEMENS
SCALANCE W Virtual Network Configuration
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
Radio Assignment
guest-portal, Captive Portal, GuestPortal
AP Default Settings
To add this VNS to the AP Default Settings Profile, please select which radio(s) you would like to broadcast this VNS.
Radio 1
Radio 2
AP Selection
To customize the list of APs which will broadcast your VNS, select the group of APs which you wish to assign (such as All APs, or All Radio 1). The list to the right will show the resulting assignment. Note that if your VNS is set to Enabled, and an AP radio has more than the maximum 8 VNSs assigned, the radio assignment for that AP will not be possible.
Select APs:
WMM:
WARNING: To use 11n, WMM is required.
Radio 1
Radio 2
AP Name
a
b/g
0002000000051503
a
b/g
0002000009051270
a/n
b/g
1111111111111111
a
b/g
lab47localap[F]
(Next: Summary)
Back
Next
Cancel

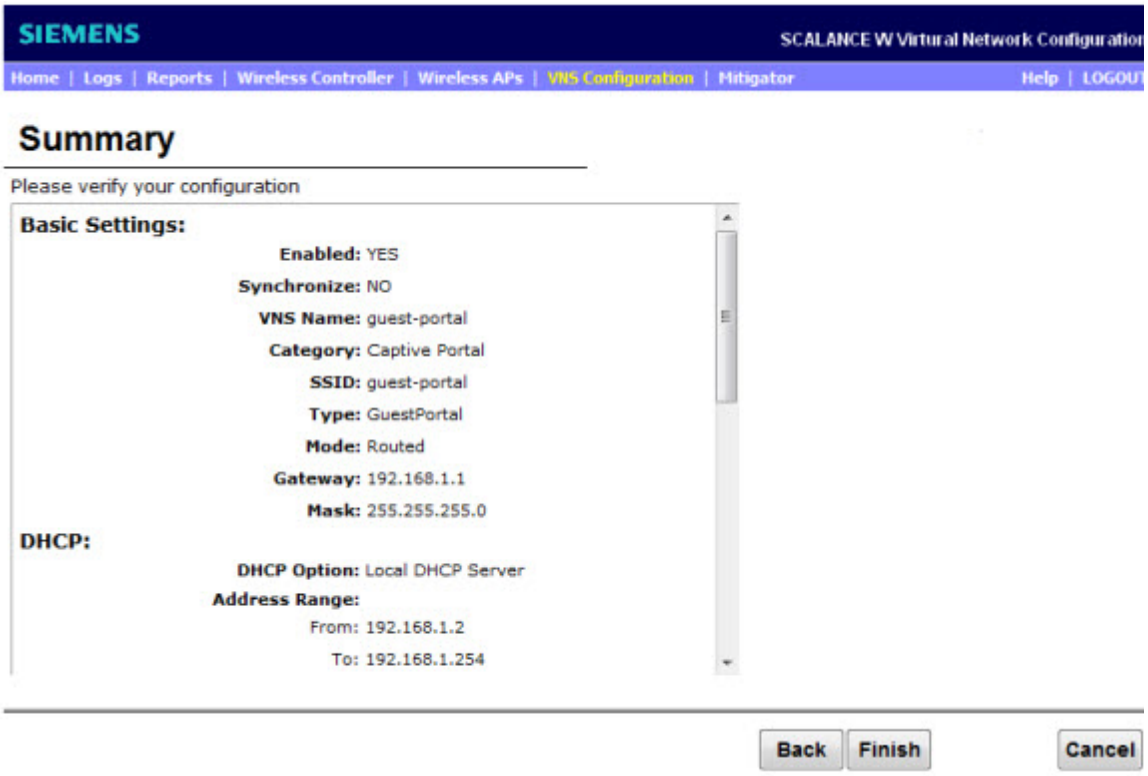
Table 7-23 Guest Portal Radio Assignment Page - Fields and Buttons

Field/Button	Description
AP Default Settings	
Radio 1 / Radio 2	Select the radios of the AP default settings profile that you want to broadcast the Captive Portal VNS.
AP Selection	
Select APs	Select the group of APs that will broadcast the Captive Portal VNS: • **all radios** — Click to assign all of the APs' radios. • **radio 1** — Click to assign only the APs' Radio 1. • **radio 2**— Click to assign only the APs' Radio 2. • **local APs - all radios** — Click to assign only the local APs. • **local APs - radio 1** — Click to assign only the local APs' Radio 1. • **local APs - radio 2** — Click to assign only the local APs' Radio 2. • **foreign APs - all radios** — Click to assign only the foreign APs. • **foreign APs - radio 1** — Click to assign only the foreign APs' Radio 1. • **foreign APs - radio 2** — Click to assign only the foreign APs' Radio 2.

Table 7-23 Guest Portal Radio Assignment Page - Fields and Buttons (continued)

Field/Button	Description
WMM	(Wi-Fi Multimedia), if enabled on an individual VNS, provides multimedia enhancements that improve the user experience for audio, video, and voice applications. WMM is part of the 802.11e standard for QoS. If enabled, the AP will accept WMM client associations, and will classify and prioritize the downlink traffic for all WMM clients. WMM clients will also classify and prioritize the uplink traffic.

13. Click **Next**. The **Summary** screen is displayed.



14. Confirm your VNS configuration. To revise your configuration, click **Back**.
15. To create your VNS, click **Finish**, and then click **Close**.

    If the SCALANCE IWLAN Controller is configured to be part of an availability pair, you can chose to synchronize the VNS on the secondary SCALANCE IWLAN Controller.
16. If applicable, you can continue to configure or edit the new VNS by clicking the individual VNS configuration tabs.

Enabling and Disabling a VNS

By default, when a new VNS is created, the VNS is added to the system as an enabled VNS. A VNS can be enabled or disabled. Disabling a VNS provides the ability to temporarily stop wireless service on a VNS. The disabled VNS configuration remains in the database for future use.

The SCALANCE IWLAN Controller can support the following VNSs:

Table 7-24 SCALANCE IWLAN Controller Active and Defined VNS Support

Platform	Active VNSs	Defined VNSs
WLC711	8	16

To Enable or Disable a VNS:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, expand the **Virtual Networks** pane and select the VNS to enable or disable.
3. On the **Core** tab, in the Status box, select or de-select the **Enable** checkbox.
4. Click **Save**. The VNS is enabled or disabled accordingly.

Renaming a VNS

To Rename a VNS:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane expand the **Virtual Networks** pane, then select the VNS you want to rename.
3. On the **Core** tab, in the **VNS Name** field, enter the new name.
4. Click **Save**. The VNS is renamed.

Deleting a VNS

You can delete a VNS that is no longer necessary.

To delete a VNS:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane expand the **Virtual Networks** pane, then select the VNS you want to rename.
3. On the **Core** tab, click the **Delete** button. A pop-up window prompts you to confirm you want to delete the VNS. Click **OK**.
4. Click **Save**. The VNS is deleted.

8

Configuring Classes of Service

his chapter describes classes of service configuration, including:

For information about...	Refer to page...
Classes of Service Overview	8-1
Configuring Classes of Service	8-1
CoS Rule Classification	8-4
Priority and ToS/DSCP Marking	8-5
Rate Limiting	8-6

Classes of Service Overview

In general, Class of Service (CoS) refers to a set of attributes that define the importance of a frame while it is forwarded through the network relative to other packets, and to the maximum throughput per time unit that a station or port assigned to a specific policy is permitted. For more information on configuring policies, see "Configuring VLAN and Class of Service for a Policy" on page 5-1.

The CoS defines actions to be taken when rate limits are exceeded.

All incoming packets may follow these steps to determine a CoS:

- Classification - identifies the first matching rule that defines a CoS.
- Marking - modifies the L2 802.1p and/or L3 ToS based on CoS definition.
- Rate limiting (drop) is set.

The system limit for the number of CoS profiles on a controller is identical to the number of policies.

Configuring Classes of Service

The Classes of Service (CoS) feature is a configuration entity containing QoS Marking (802.1p and ToS/DSCP), Inbound/Outbound Rate Limiting and Transmit Queue Assignments. The CoS ToS marking capability allows for NAC-based redirection to different captive portals on the same WLAN Service.

The supported CoS attributes are enforced on the Wireless Controller (data plane) and on the APs.

To configure Classes of Service:

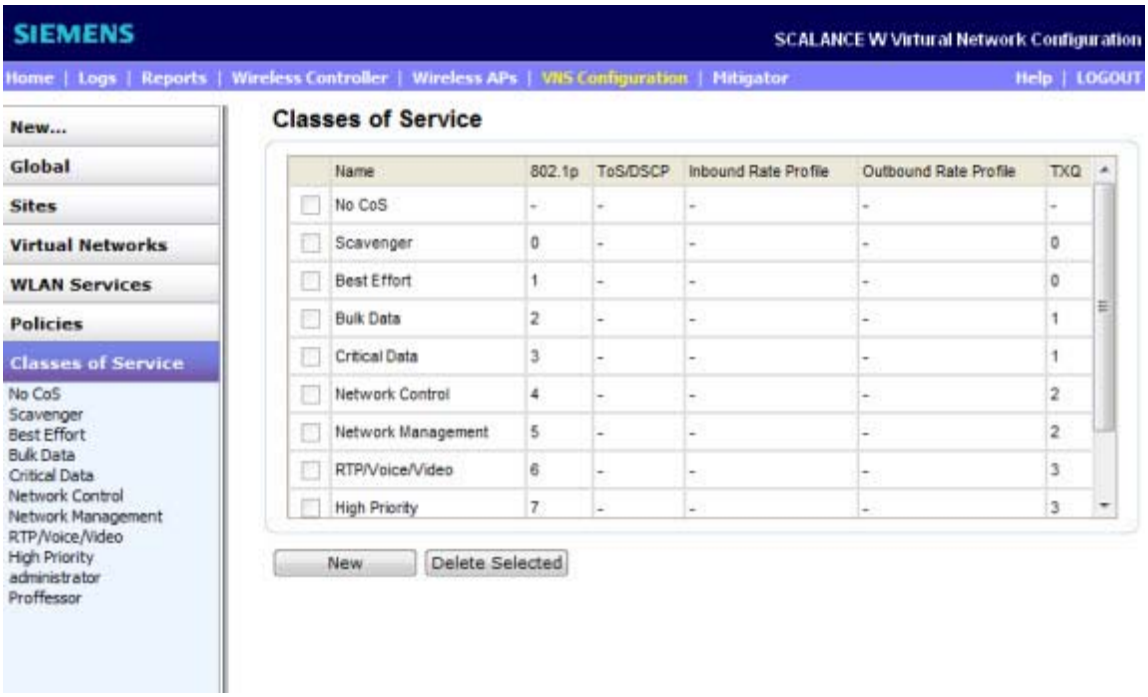
1. From the top menu, click **VNS Configuration**.

   The **Virtual Network Configuration** screen displays.

Configuring Classes of Service

2. In the left pane click Classes of Service.

   The **Classes of Service** screen displays.



Note:
"No CoS" means that the traffic to which it is assigned will not be remarked, the controller software will decide the appropriate transmit queue and no rate limits will be applied on traffic traveling to or from the station to which the CoS is applied. The "No CoS" CoS is predefined and cannot be removed.

3. In the left pane, click the name of the Classes of Service that you want to edit, or click the **New** button to create a new CoS. The **Class of Service** configuration page displays. By default, the

Configuring Classes of Service

General tab displays. Table 8-1 describes the fields and buttons on the General tab.

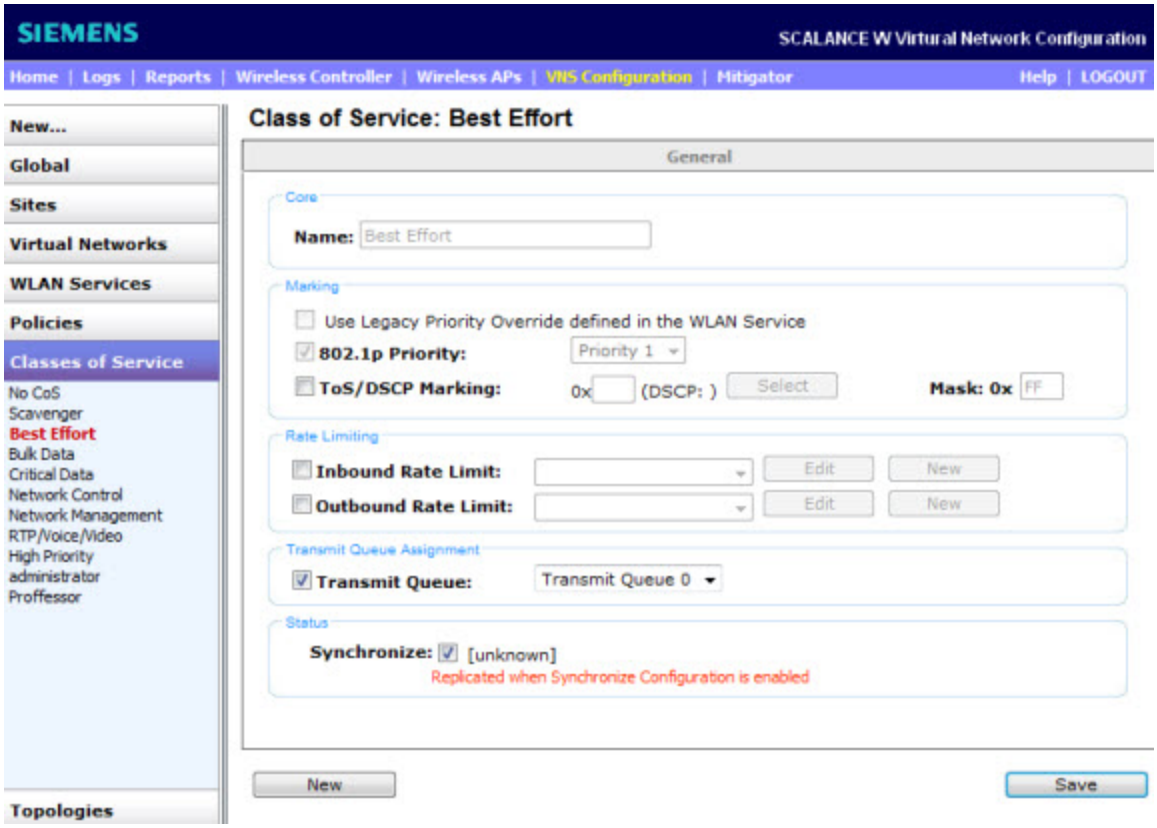


Table 8-1 General Tab - Fields and Buttons

Field/Button	Description
Core	
Name	Enter a name to assign to this class of service.
Marking	
Use Legacy Priority Override defined in the WLAN Service	Priority override allows you to define and force the traffic to a desired priority level. Priority override can be used with any combination. You can configure the service class and the DSCP values. Select this checkbox to use Priority Override defined in the WLAN as in previous releases. For more information, see Configuring the Priority Override.
802.1p Priority	Select this checkbox to define how the Layer 2 priority of the packet will be marked. From the drop-down list, select Priority 0 to Priority 7. For more information, see Priority and ToS/DSCP Marking. Note: This selection is not available if Legacy Priority Override is checked.

Table 8-1 General Tab - Fields and Buttons (continued)

Field/Button	Description
ToS/DSCP Marking	Select this checkbox to define how the Layer 3 ToS/DSCP will be marked. Enter a hexadecimal value in the 0x (DSCP:) field, or Click the **Select** button to open the ToS/DSCP Configuration dialog. For more information, see Configuring ToS/DSCP Marking. Note: This selection is not available if Legacy Priority Override is checked.
Mask: 0x	Displays the hexadecimal value to use for the ToS/DSCP value. For example, if the mask is 0xF0, then only the four most significant bits of the ToS of the received packets are marked. So, if the received ToS is 0x33 and the ToS marking is set to 0x2A, then the resulting ToS is 0x23.
Rate Limiting	
Inbound Rate Limit	Select this checkbox, and then select an inbound rate limit from the drop-down list or click the **New** button to create a new inbound rate limit profile. To edit an existing inbound rate limit profile, select the profile from the drop-down list and then click the **Edit** button. For more information, see Rate Limiting.
Outbound Rate Limit	Select this checkbox, and then select an outbound rate limit from the drop-down list or click the **New** button to create a new outbound rate limit profile. To edit an existing outbound rate limit profile, select the profile from the drop-down list and then click the **Edit** button. For more information, see Rate Limiting.
Transmit Queue Assignment	
Transmit Queue	Select this checkbox, and select a Transmit Queue from the drop-down list. The Transmit Queue assignment is an override to the default TXQ assignment specified in the 802.1p priority, but without remarking the actual 802.1p field.
Status	
Synchronize	Click to enable synchronization of this CoS to the peer controller in the availability pair.

CoS Rule Classification

Classification is the process of finding the first matching rule that defines a CoS for an incoming packet. The order of classification is as follows:

1. Use the CoS assigned by the first policy rule matched by the packet that explicitly assigns a CoS.
2. If no CoS found, use the default CoS of the Policy.

3. If still no CoS found, use the default CoS of the WLAN (for non-auth policy).

For inbound traffic, classification is done at the AP (if AP Filtering is enabled), otherwise it is done at the controller. For outbound traffic, classification is always done at the controller.

The Rule that assigns authorization (Access Control) may not be the same rule that assigns CoS. Therefore, up to two passes are made through the filter rules for each packet. If the first pass results in the packet being allowed a second pass will take place to classify the packet for CoS.

- The first pass looks for authorization (allow, deny)
- The second pass classifies and assigns the CoS.

The number of rules reported to Policy Manager are limited to the number of rules allowed on the controller. On the controller, a single rule can contain different classification types whereas for Policy Manger this rule may be split into several rules. For example, if a rule defines an IP source address and also a ToS value, then this rule would be split into an IP type and a ToS type. Rules exceeding the limit after splitting will be dropped.

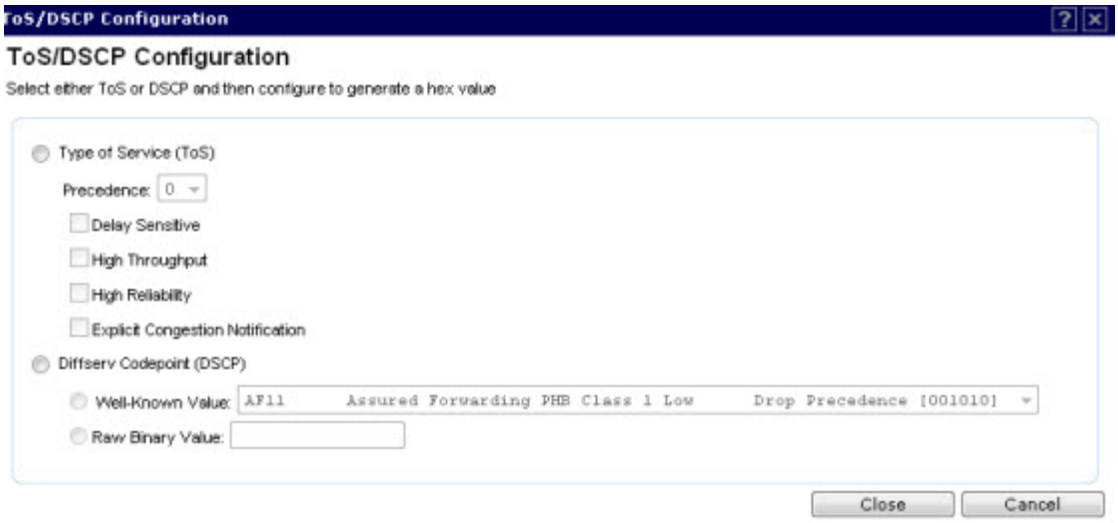
Priority and ToS/DSCP Marking

After packets are classified, they are assigned a final User Priority (UP) value. The Priority and ToS/DSCP Marking bits to be applied to the packet is taken from the CoS and if not set, the received value (ToS/DSCP) is used. ToS/DSCP Marking rewrites the Layer 3 Type of Service (ToS) byte.

Configuring ToS/DSCP Marking

To Configure ToS/DSCP Marking:

1. From the Class of Service General tab, click ToS/DSCP Marking.
2. Click the **Select** button. The ToS/DSCP Configuration dialog displays:



Note:
Select either Type of Service (ToS) or Diffserv Codepoint (DSCP) from this dialog. You cannot configure both types.

3. Click Type of Service (ToS):
   - Select a Precedence value from the drop-down list,
   - Select a specific ToS from the following list:
     - Delay Sensitive
     - High Throughput
     - High Reliability
     - Explicit Congestion Notification
4. Click Diffserv Codepoint (DSCP):
   - Select a Well-known Value or
   - Enter a Raw Binary Value.
5. Close the Configuration dialog.

The logic used to find the final User Priority (UP) depends on the CoS, the received UP, or the final ToS/DSCP value. Here are the steps followed to determine the final UP:

1. Use UP markings defined in CoS (directly or via Legacy UP override).
2. If still no UP, use UP from the received packet.
3. If still no UP, use DSCP marking defined in CoS and map to UP with WLANs DSCP-to-UP mapping table.
4. If still no UP, use received DSCP value and map to UP with WLANs DSCP-to-UP mapping table.

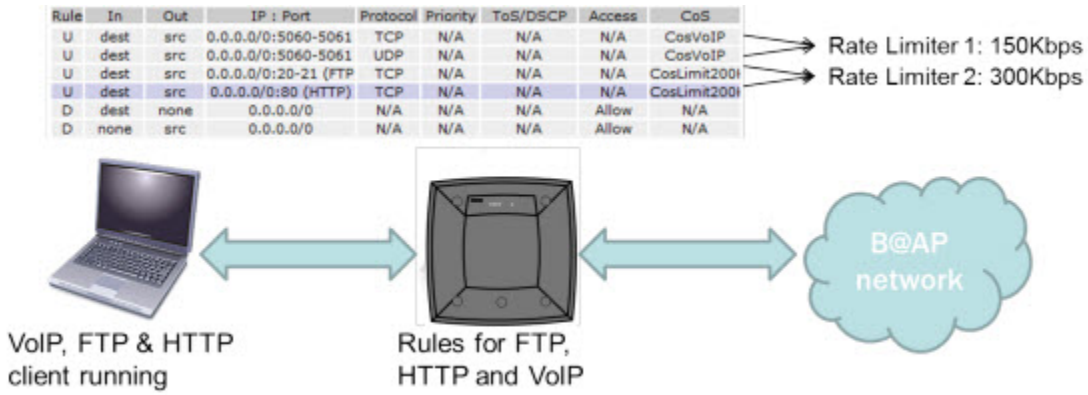
Rate Limiting

The Inbound and Outbound Rate Limit is enforced on a per-station basis whether the rate limit is assigned to a rule, policy or WLAN. Each station has its own set of counters that are used to monitor its wireless network utilization. Traffic from other stations never count against a station's rate limits.

- Controllers support up to 128 system wide rate profiles when managed from the controller.
- Each policy can use a maximum of 9 inbound rate profiles and 9 outbound rate profiles. For each direction there can be one rate profile assigned by the policy's default CoS and 8 other rate profiles assigned by the policy's rules.
- There is no limit to how many rules allow CoS assignments as long as there are never more than 8 + 8 rate profiles assigned by Classes of Service.

If two or more rules in the same policy assign the same named rate profile to a station's packets, then those rules "share" the rate profile. In Figure 8-1, a policy's rules assign both HTTP and FTP traffic to the same rate limiter. The sum of the amounts of HTTP and FTP traffic determine whether the rate limit is being exceeded. Each station gets its own set of rate limiters. So the HTTP and FTP traffic of other stations never gets counted against a station's own rate profile limits.

Figure 8-1 Rate Limiter Example


Rule In Out IP : Port Protocol Priority ToS/DSCP Access CoS
U dest src 0.0.0.0/0:5060-5061 TCP N/A N/A N/A CosVoIP
U dest src 0.0.0.0/0:5060-5061 UDP N/A N/A N/A CosVoIP
U dest src 0.0.0.0/0:20-21 (FTP TCP N/A N/A N/A CosLimit200
U dest src 0.0.0.0/0:80 (HTTP) TCP N/A N/A N/A CosLimit200
D dest none 0.0.0.0/0 N/A N/A N/A Allow N/A
D none src 0.0.0.0/0 N/A N/A N/A Allow N/A
Rate Limiter 1: 150Kbps
Rate Limiter 2: 300Kbps
B@AP network
VoIP, FTP & HTTP client running
Rules for FTP, HTTP and VoIP

9

Configuring Sites

This chapter describes Sites configuration, including:

For information about...	Refer to page...
VNS Sites Overview	9-1
Configuring Sites	9-1
Recommended Deployment Guidelines	9-2
Radius Configuration	9-5
Selecting AP Assignments	9-7
Selecting WLAN Assignments	9-7

VNS Sites Overview

A Site is a mechanism for grouping APs and refers to specific Policies, Classes of Service (CoS) and RADIUS servers that are grouped to form a single configuration. Sites allow for deployment where the authentication server is local and provides the ability to associate a new 802.1x client and to allow 802.1x clients to roam with Fast Roaming when the AP's home controller is unreachable.

When configuring a Site profile, two additional tabs are included:

- An AP Assignments tab provides a list of APs that can be assigned to a specific Site. Only specific thin series APs to a Site, and once an AP is assigned, the controller will preload the APs with server configuration used by the Site.
- A WLAN Assignments tab lists available WLANs and specific Radio assignments. WLAN Services can be assigned in the same way as AP Load Groups (see "Configuring Co-located APs in Load Balance Groups" on page 3-69).

Configuring Sites

A Site can use any Policy or CoS defined on the SCALANCE IWLAN Controller. A Site can also use any Bridged at AP, Bridged at Controller or Routed Topology defined in the controller. Once an AP is assigned to a Site, the controller will preload the AP with Topologies, Policies, CoS and RADIUS server configuration used by the Site. The AP will then be able to use these configuration items even when the controller is unreachable.

An AP that is part of a Site which has local RADIUS client services enabled will use its own RADIUS client to:

- Perform all MAC-based authentication for all stations associated with it on any of the WLAN Services assigned to it.

- Perform all RADIUS server interactions for 802.1x authentications for all stations associated with it on any 802.1x WLAN Service assigned to it.

Recommended Deployment Guidelines

The Sites feature introduces new and complex interactions between hardware and software components. Sites are recommended for customers who have an AP-to-controller link (in a normal deployment) which they expect will be disconnected for long periods of time, but still expect to give service to users.

Note:
For best performance and maintainability, do not use the Site feature if the AP-AC link is normally connected.

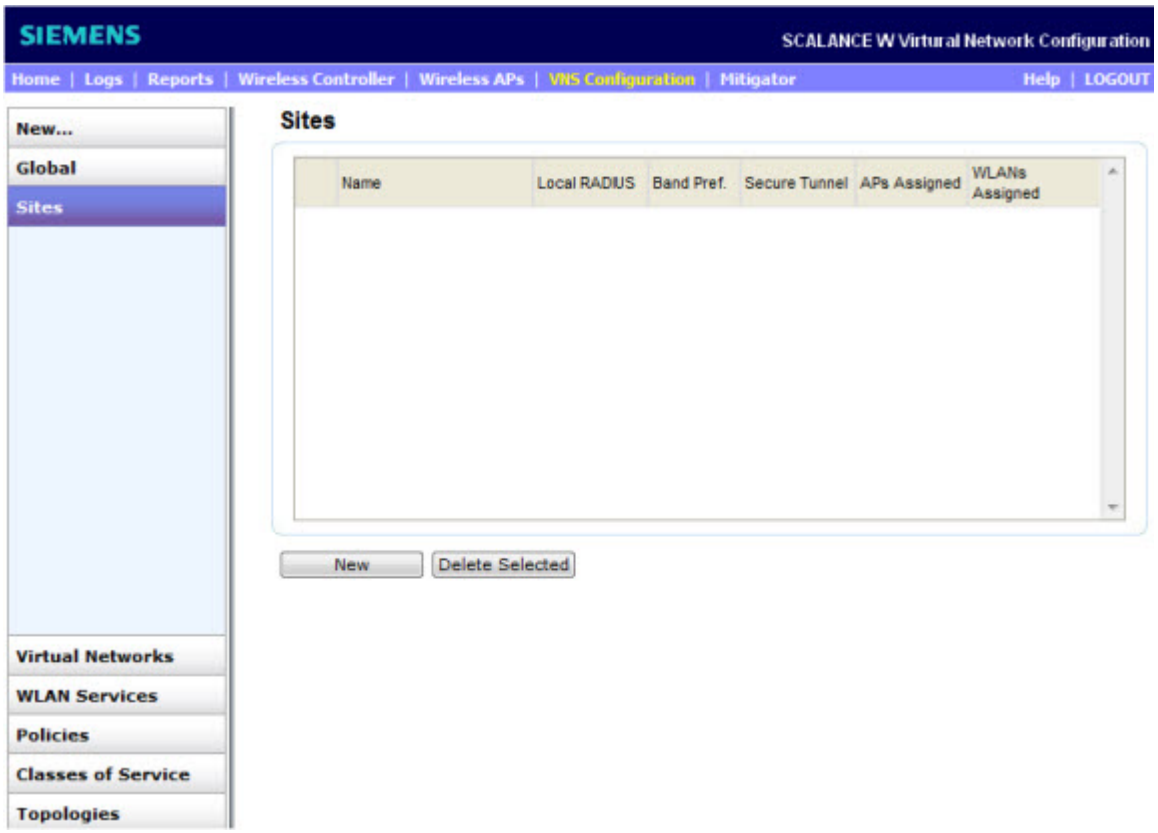
The following guidelines are recommended to configure a secure and easy-to-maintain Site:

- Use 802.1x and WPA2 Enterprise authentication and privacy.
- Do not use MAC-based authentication (MBA) unless absolutely required.
- Do not use more than 32 filter rules within a single AP filter.
- Do not configure a Sites AP Session Availability function without an AP-to-controller link.
- Do not configure the following features in a Sites configuration since they rely on a consistent AP-to-controller link:
  - Tunneled/Routed topologies
  - RADIUS accounting
  - Captive Portal

Defining Policies, CoS, and RADIUS Servers for Local RADIUS Authentication

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.

2. In the left pane, click **Sites**. The **Sites** screen displays**.**



3. In the left pane, click the name of the Site that you want to edit, or click the **New** button to create a new Site. The **Site** configuration page displays. By default, the **Configuration** tab

displays. Table 9-1 describes the fields and buttons on the Configuration tab.

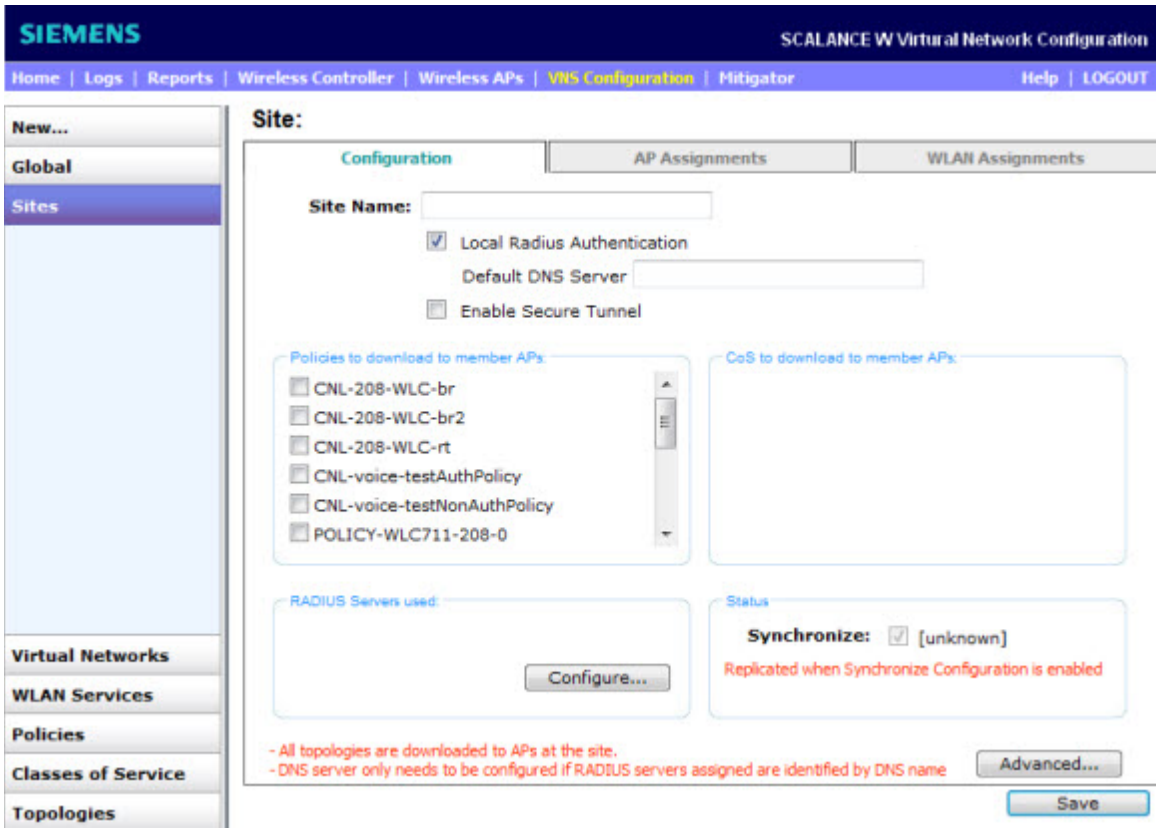


Table 9-1 Configuration Tab - Fields and Buttons

Field/Button	Description
Site Name	Enter a name to assign to this Site.The name is unique among Sites on the controller. AP load group names and Site names are part of the same space so a load group and a Site cannot have the same name.
Local Radius Authentication	Select this checkbox to choose a local RADIUS Server for login credentials and authentication.
Default DNS Server	This field is used to resolve RADIUS server names to IP addresses if necessary.
Enable Secure Tunnel	Select this checkbox to provide encryption, authentication, and key management for data traffic between APs and/or controllers.
Policies to download to member APs	Select policies that will be applied to APs with this specific Site configuration. Physical topologies and third party AP enabled topologies cannot be assigned to a Site.
CoS to download to member APs	Displays the Class of Service that will be applied to APs with this specific Site configuration.
RADIUS Server used	Displays the list of available RADIUS servers used for this Site (for more information, see “Radius Configuration” on page 9-5). The RADIUS servers assigned to a Site override the list of RADIUS servers in the WLAN Service definition for APs that are part of the Site.

Table 9-1 Configuration Tab - Fields and Buttons (continued)

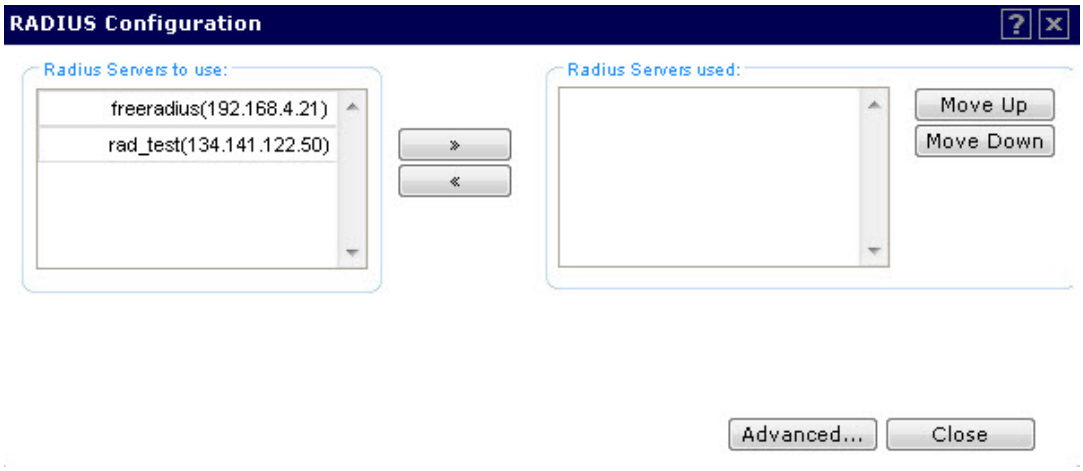
Field/Button	Description
Status: Synchronize: (unknown)	Select this checkbox to enable automatic synchronization with an availability peer. Refer to "Using the Sync Summary" on page 7-19 for information about viewing synchronization status. If this Site is part of an availability pair, Siemens recommends that you enable this feature.
Advanced Button	
Tunnel Encryption	Select a method for secure tunnel encryption. Supports encryption between an AP and Controller and/or between APs.
Band Preference	Select this checkbox to enable APs to become members of both this Site and a load group at the same time.
Load Control	Select the following parameters for each radio assigned to this Site: **Enable:** Select this checkbox to enable Radio Load Control (RLC) for individual radios (Radio1 and Radio2) associated with this Site. **Max. # of Clients:** Enter the maximum number of clients for Radio 1 and Radio 2. The default limit is 60. The valid range is: 5 to 60. **Strict Limit:** Select this checkbox to enable a strict limit on the number of clients allowed on a specific radio, based on the max # of clients allowed. Limits can be enforced separately for radio1 and radio 2.
RADIUS Authentication: Replace Called Station ID with Zone	Select this checkbox to allow the RADIUS client to send the AP Zone as the Called-Station ID instead of the radio MAC address. This feature can be enabled regardless of whether the Site is using centrally located or local RADIUS servers.

Radius Configuration

A single Site definition can be configured with 1 or 2 RADIUS servers. The RADIUS servers assigned to a Site can only be selected from the list of servers displayed on the RADIUS configuration dialog.

To Select Site RADIUS Servers:

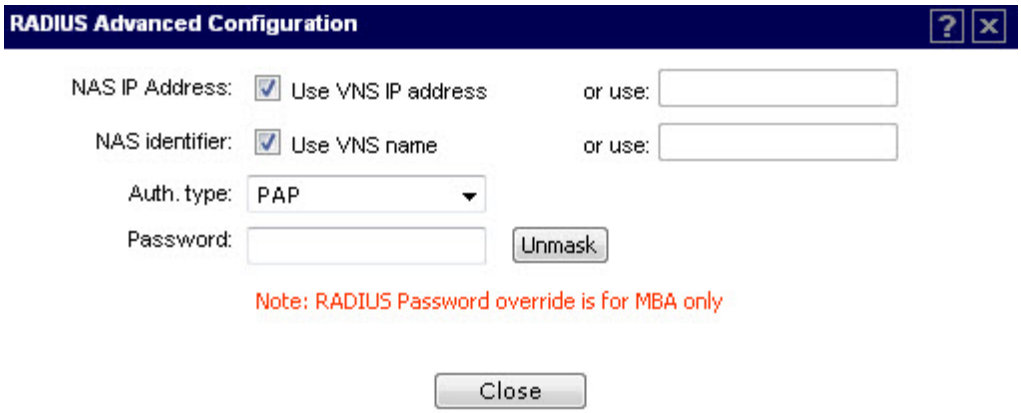
1. From the **Configuration** tab, under RADIUS Server used, click **Configure**. The RADIUS Configuration dialog displays.



2. Select a RADIUS server from the list of available servers and click the right-arrow button.

   The server will be moved under the RADIUS Servers used list.

3. Click the **Move UP** or **Move Down** buttons to change the order of the RADIUS Servers used.
4. Click the **Advanced** button. The RADIUS Advanced Configuration dialog appears.

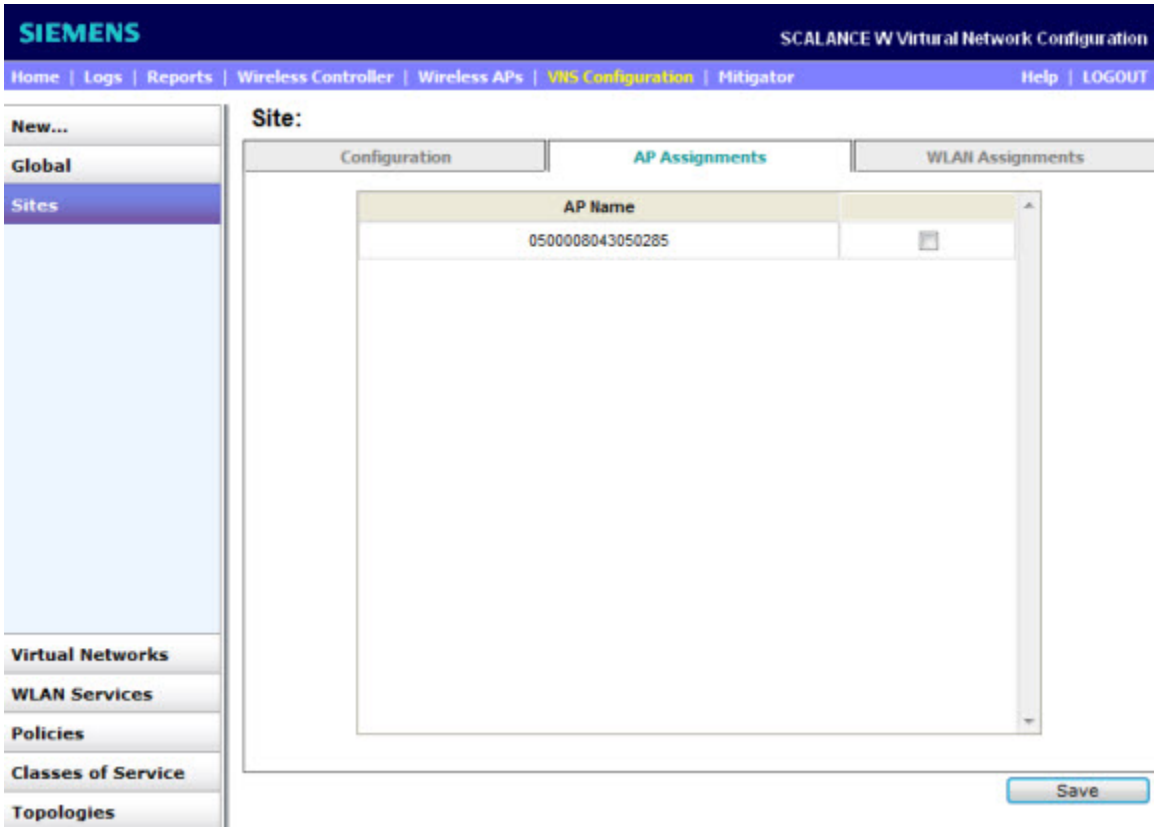


5. The following values can be edited:
   - **NAS IP Address** — Click the checkbox to use the existing IP address of the VNS server, or enter an alternate IP Address in the box provided.
   - **NAS Identifier** — Click the checkbox to use the name of the existing VNS server, or enter an alternate name in the box provided.
   - **Auth. type** — Select an authorization protocol from the drop-down list (PAP, CHAP, MS-CHAP, or MS-CHAP2).
   - **Password** — To override the default password (see "VNS Global Settings" on page 7-3) for MBA - MAC Based authorization only. Select **Mask** to display the password, and select **Unmask** to hide the entry.
6. Click **Close**.

Selecting AP Assignments

To Select AP Assignments:

1. Click the **AP Assignments** tab. The tab displays, allowing you to select APs that will be applied to this Site configuration.

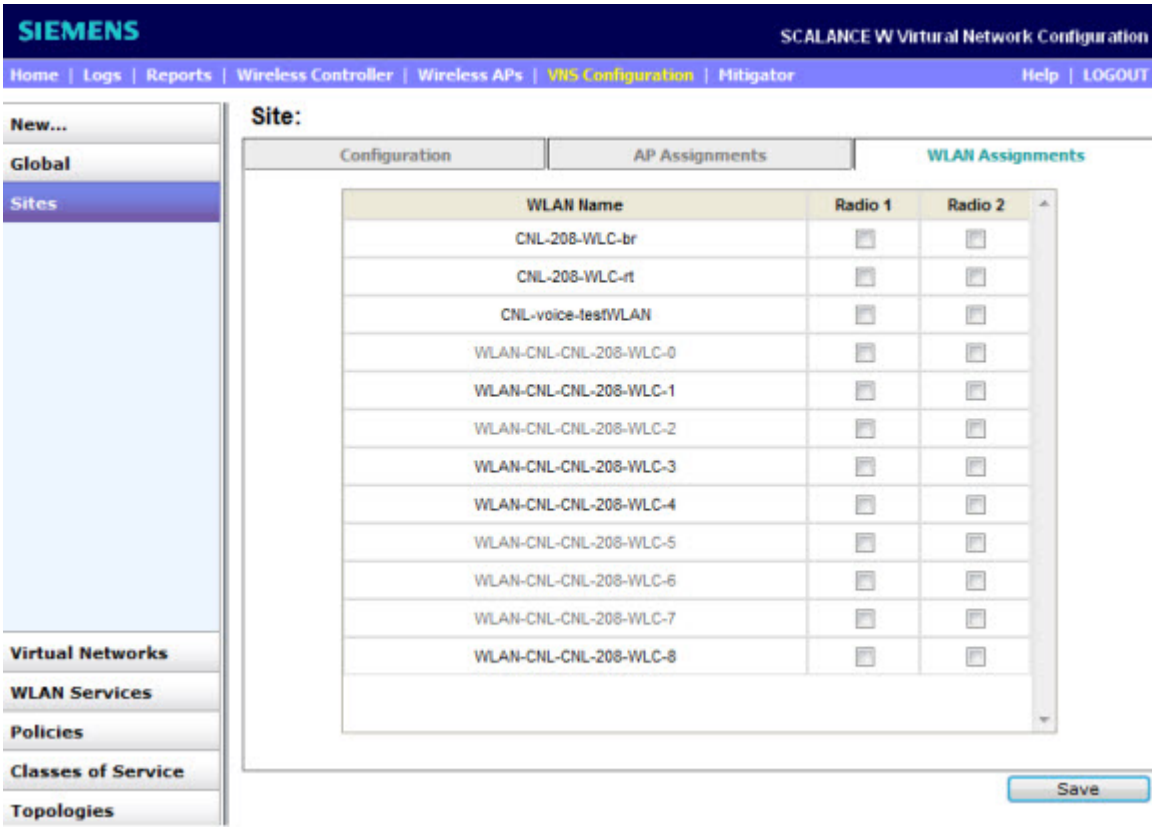


Selecting WLAN Assignments

To Select WLAN Assignments:

1. Click the **WLAN Assignments** tab.
2. Select Radio assignments (Radio 1 and Radio 2) for specific WLANs that will be applied to this Site configuration.

3. Click **Save.**


SIEMENS
SCALANCE W Virtural Network Configuration
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
New...
Global
Sites
Virtual Networks
WLAN Services
Policies
Classes of Service
Topologies
Site:
Configuration
AP Assignments
WLAN Assignments
WLAN Name
Radio 1
Radio 2
CNL-208-WLC-br
CNL-208-WLC-rt
CNL-voice-testWLAN
WLAN-CNL-CNL-208-WLC-0
WLAN-CNL-CNL-208-WLC-1
WLAN-CNL-CNL-208-WLC-2
WLAN-CNL-CNL-208-WLC-3
WLAN-CNL-CNL-208-WLC-4
WLAN-CNL-CNL-208-WLC-5
WLAN-CNL-CNL-208-WLC-6
WLAN-CNL-CNL-208-WLC-7
WLAN-CNL-CNL-208-WLC-8
Save

10

Working with a Mesh Network

This chapter describes a Wireless Distribution System (Mesh), including:

For information about...	Refer to page...
About Mesh	10-1
Simple Mesh Configuration	10-2
Wireless Repeater Configuration	10-2
Wireless Bridge Configuration	10-3
Examples of Deployment	10-4
Mesh WLAN Services	10-4
Key Features of Mesh	10-7
Deploying the Mesh System	10-10
Changing the Pre-shared Key in a Mesh WLAN Service	10-16

About Mesh

Mesh networks enable you to expand the wireless network by interconnecting the Wireless APs through wireless links in addition to the traditional method of interconnecting Wireless APs via a wired network. In a Mesh deployment, each node not only captures and disseminates its own data, but it also serves as a relay for other nodes, that is, it collaborates to propagate the data in the network.

A Mesh deployment is ideally suited for locations where installing Ethernet cabling is too expensive, or physically impossible.

The Mesh network can be deployed in three configurations:

- Simple Mesh Configuration
- Wireless Repeater Configuration
- Wireless Bridge Configuration

Note:
Mesh is supported on all W786C/W788C access points.

Simple Mesh Configuration

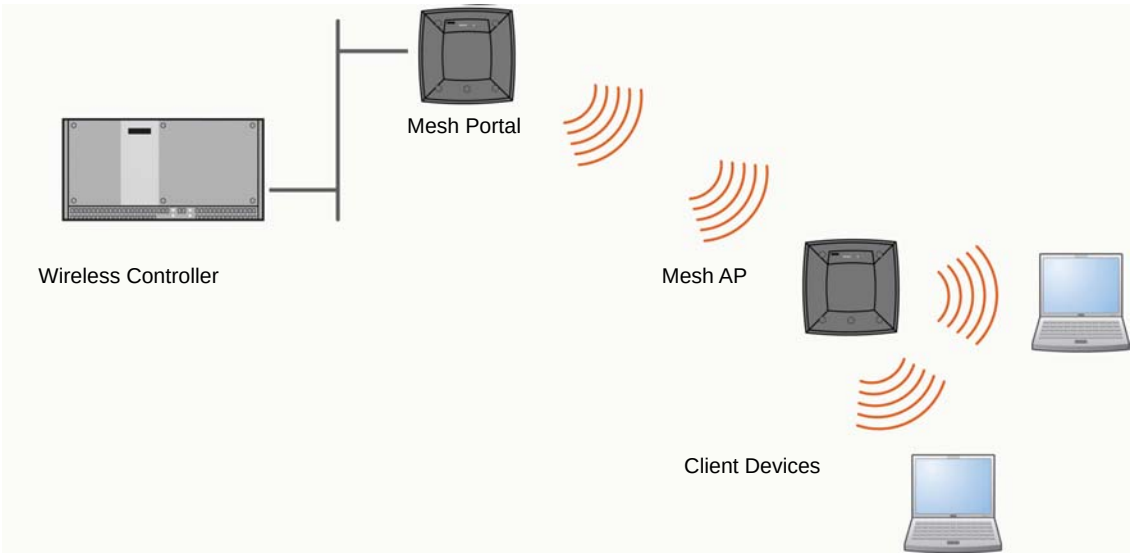
In a typical Mesh configuration, the Wireless APs are connected to the distribution system via an Ethernet network, which provides connectivity to the SCALANCE IWLAN Controller.

However, when a Wireless AP is installed in a remote location and can't be wired to the distribution system, an intermediate Wireless AP is connected to the distribution system via the Ethernet link. This intermediate Wireless AP forwards and receives the user traffic from the remote Wireless AP over a radio link.

The intermediate Wireless AP that is connected to the distribution system via the Ethernet network is called Mesh portal, and the Wireless AP that is remotely located is called the Mesh AP.

The following figure illustrates the Simple Mesh configuration:

Figure 10-1 Simple Mesh Configuration

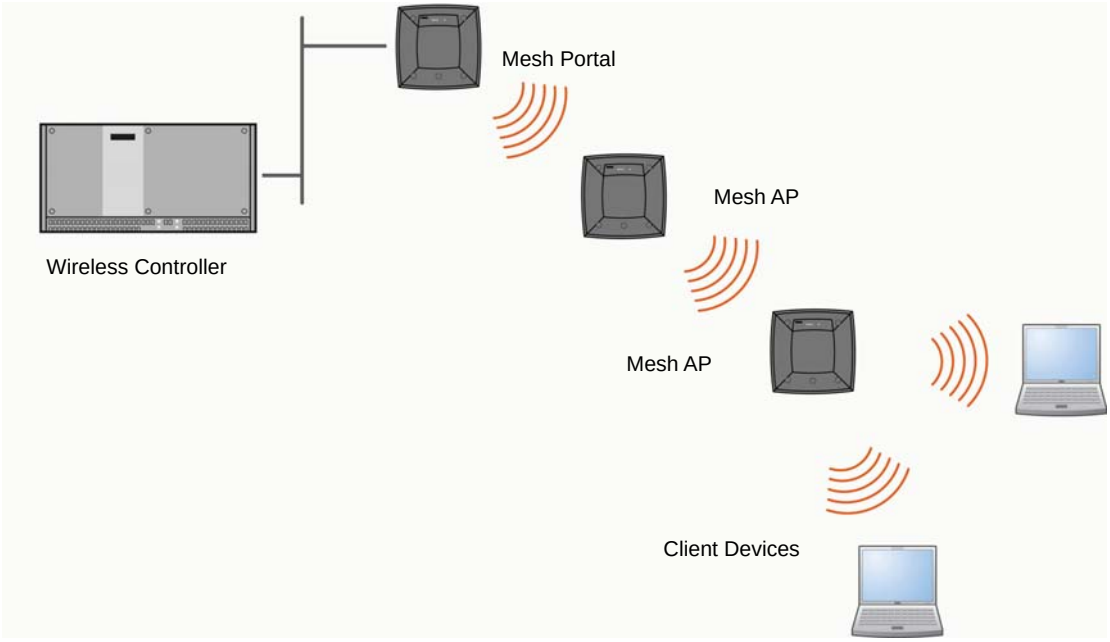


Wireless Repeater Configuration

In Wireless Repeater configuration, a Mesh AP is installed between the Mesh Portal and the destination Mesh AP. The Mesh AP relays the user traffic between the Mesh Portal and the destination Mesh AP. This increases the WLAN range.

The following figure illustrates the Wireless Repeater configuration:

Figure 10-2 Wireless Repeater Configuration

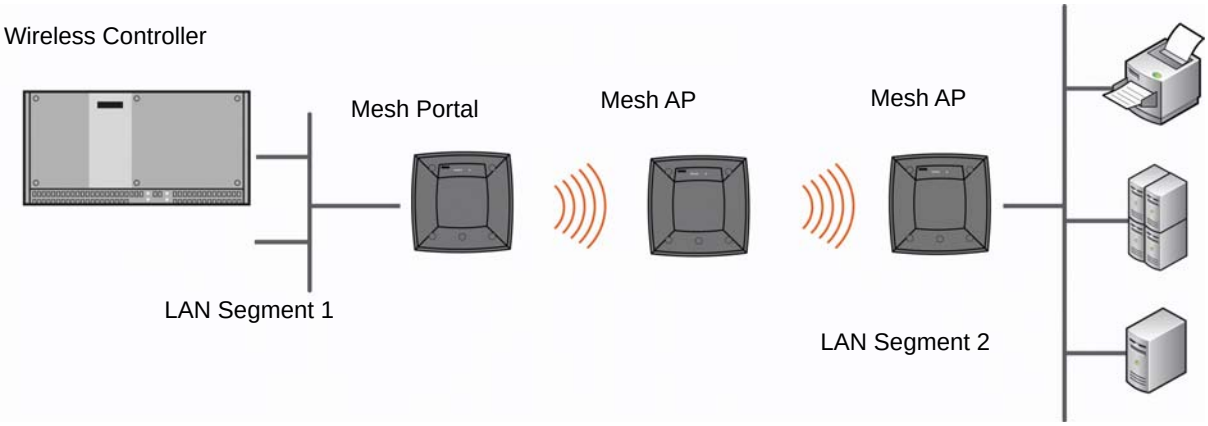


Note:
You should restrict the number of repeater hops in a Wireless Repeater configuration to three for optimum performance.

Wireless Bridge Configuration

In Wireless Bridge configuration, the traffic between two Wireless APs that are connected to two separate wired LAN segments is bridged via Mesh link. You may also install a Mesh AP between the two Wireless APs connected to two separate LAN segments.

Figure 10-3 Wireless Bridge Configuration

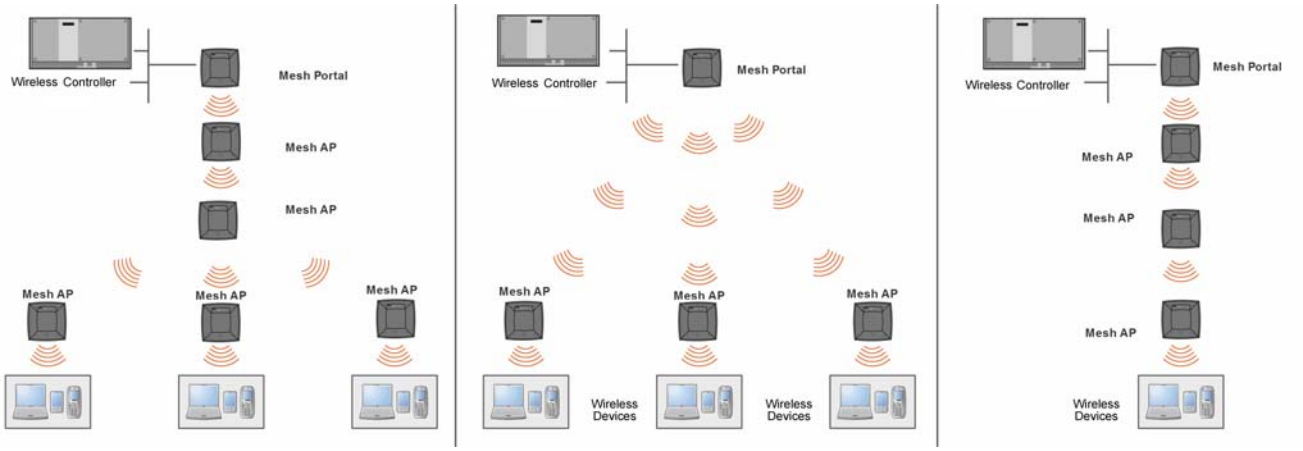


When you are configuring the Wireless Bridge configuration, you must specify on the user interface that the Mesh AP is connected to the wired LAN.

Examples of Deployment

The following illustration depicts a few examples of Mesh deployment.

Figure 10-4 Examples of Mesh Deployment



Mesh WLAN Services

In a traditional WLAN deployment, each radio of the Wireless AP can interact with the client devices on a maximum of eight networks.

In Mesh deployment, one of the radios of every Mesh Wireless AP establishes a Mesh link on an exclusive WLAN Service. The Mesh Wireless AP is therefore limited to seven network WLAN Services on the Mesh radio. The other radio can interact with the client-devices on a maximum of eight WLAN Services.

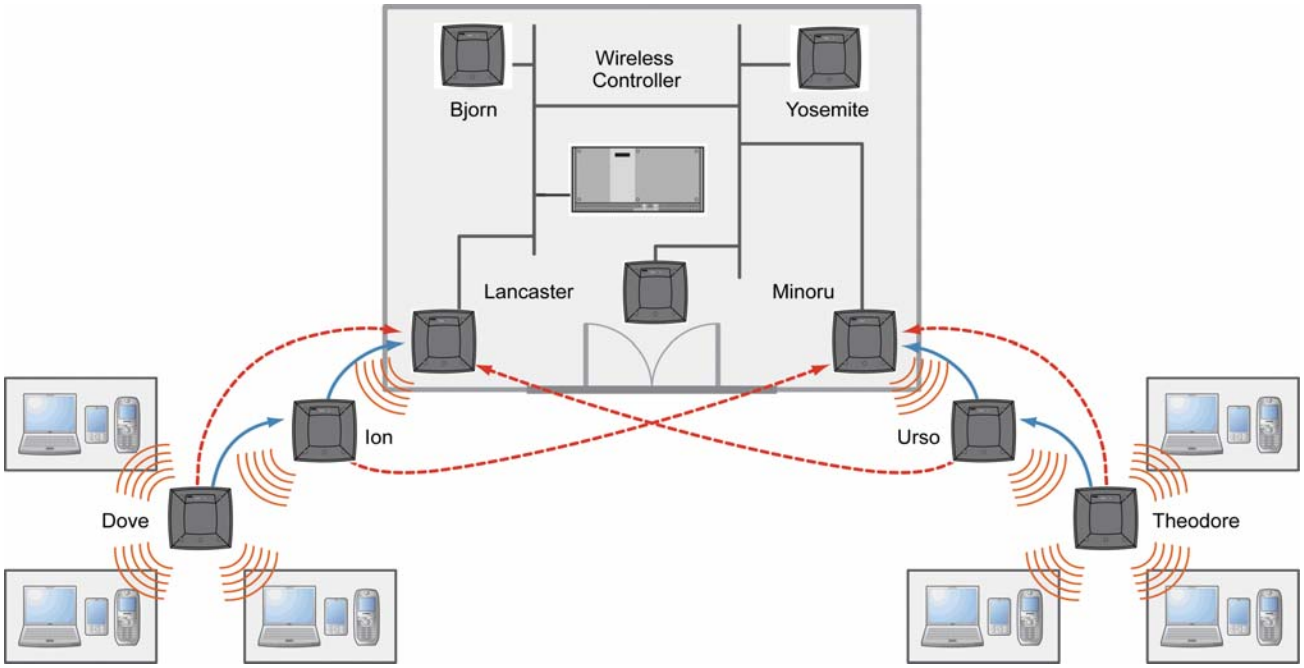
The WLAN Service on which the Wireless APs establish the Mesh link is called the Mesh WLAN Service.

A Mesh can be setup either by using either a single Mesh WLAN Service or multiple Mesh WLAN Services. The following figures illustrate the point.

In Figure 10-5 on page 10-5:

- The rectangular enclosure denotes an office building.
- The four Wireless APs — Minoru, Yosemite, Bjorn and Lancaster — are within the confines of the building and are connected to the wired network.
- The space around the office building is a warehouse.
- The solid arrows point towards Current Parents.
- The dotted arrows point towards Alternative Parents.

Figure 10-5 Deployment Example

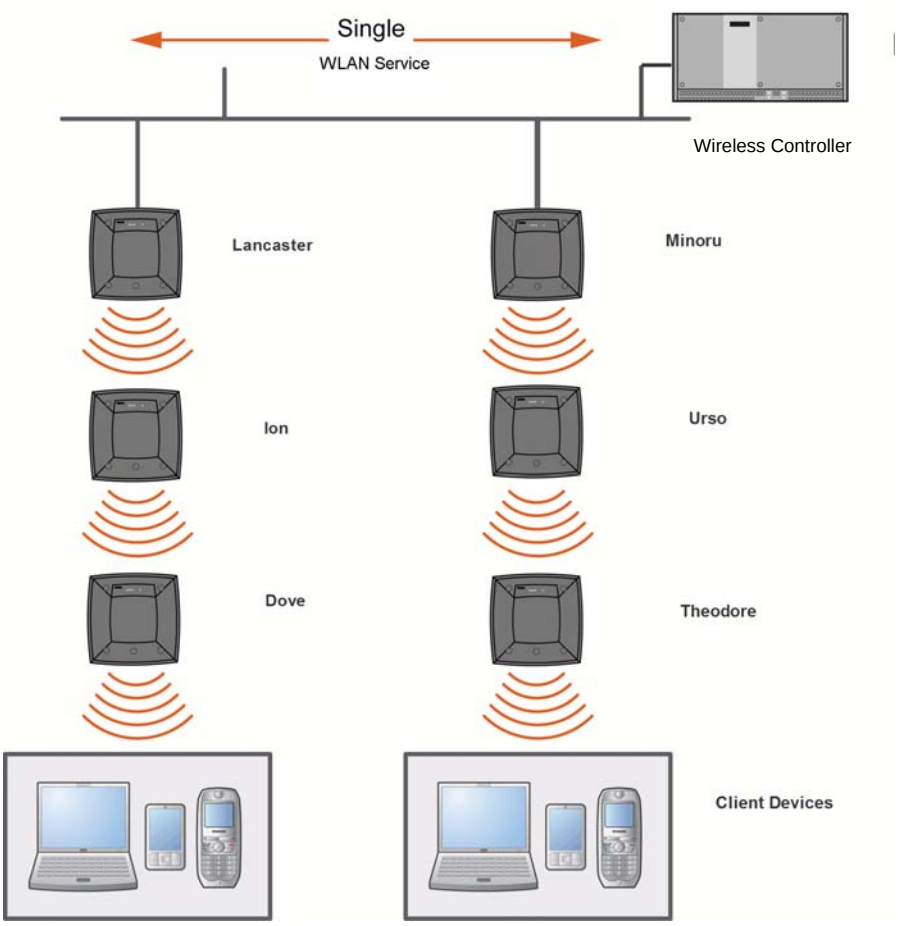


Mesh Setup with a Single Mesh WLAN Service

Deploying the Mesh for the above example using a single Mesh WLAN Service results in the following structure shown in Figure 10-6 on page 10-6.

The tree will operate as a single Mesh entity. It will have a single Mesh SSID and a single pre-shared key for Mesh links. This tree will have multiple roots. For more information, see "Multi-Root Mesh Topology" on page 10-10.

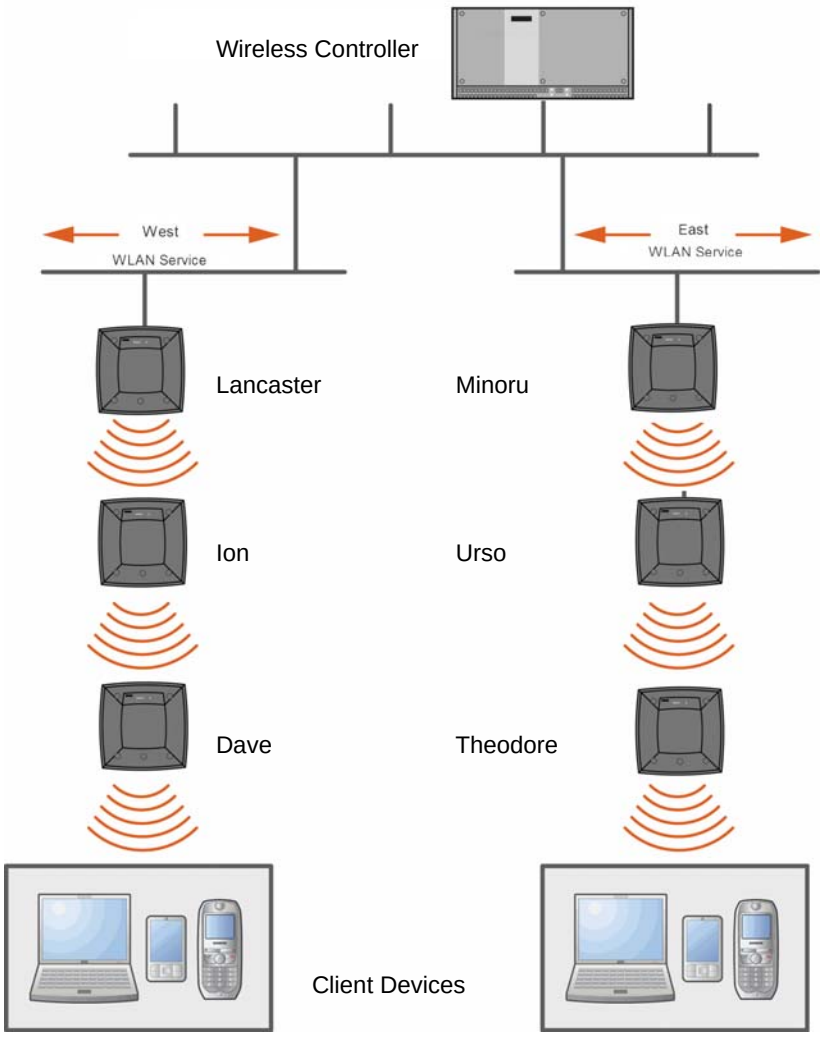
Figure 10-6 Mesh Setup with a Single Mesh WLAN Service



Mesh Setup with Multiple Mesh WLAN Services

You can also deploy the same Mesh in Figure 10-5 using two Mesh WLAN Services. The Two Mesh WLAN Services will create two independent Mesh trees. Both the trees will operate on separate SSIDs and use separate pre-shared keys.

Figure 10-7 Mesh Setup with Multiple Mesh WLAN Services



Key Features of Mesh

Some key features of Mesh are:

- Self-Healing Network
- Tree-like Topology
- Radio Channels
- Multi-Root Mesh Topology
- Link Security

Self-Healing Network

Data in a Mesh network propagates along a path, by hopping from node to node until the destination is reached. To ensure that all its paths' availability, the Mesh network allows for continuous connections and reconfiguration around broken or blocked paths, referred to as self-

healing. The self-healing capability enables a routing based network to operate when one node breaks down or a connection goes bad.

Tree-like Topology

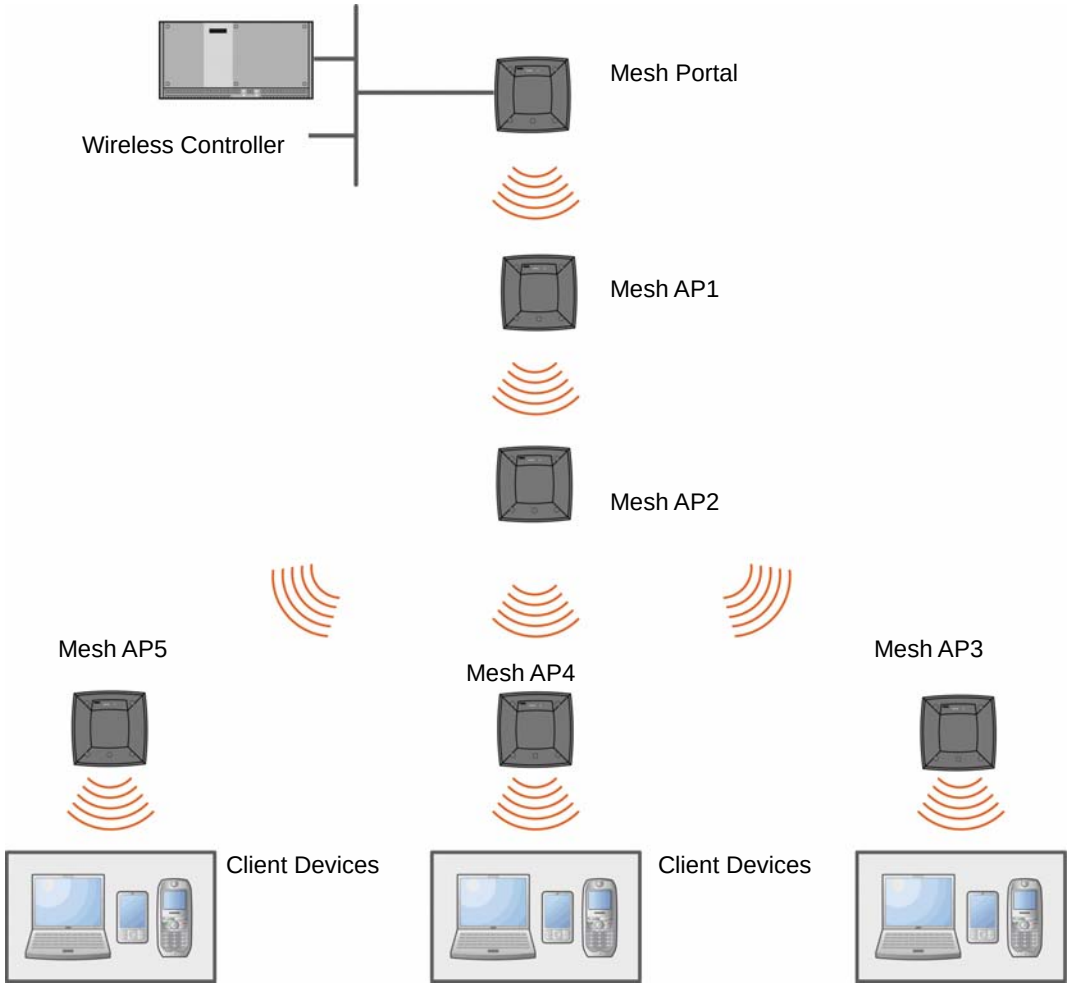
The Wireless APs in Mesh configuration can be regarded as nodes, and these nodes form a tree-like structure. The tree builds in a top down manner with the Mesh Portal being the tree root, and the Mesh AP being the tree leaves.

The nodes in the tree-structure have a parent-child relationship. The Mesh AP dynamically selects the best parent for connecting to the Mesh portal. A Mesh AP can have the role of both parent and child at the same time and the AP's role can change dynamically.

Figure 10-8 illustrates the parent-child relationship between the nodes in a Mesh topology.

- Mesh Portal is the parent of Mesh AP 1.
- Mesh AP 1 is the child of Mesh Portal.
- Mesh AP 1 is the parent of Mesh AP 2.
- Mesh AP 2 is the child of Mesh AP 1.
- Mesh AP 2 is the parent of the following Wireless APs:
  - Mesh AP 5
  - Mesh AP 4
  - Mesh AP 3
- All the three Mesh APs are the children of Mesh AP 2.

Figure 10-8 Parent-Child Relationship Between Wireless APs in Mesh Configuration



Note:
Siemens recommends that you limit the number of APs participating in a Mesh tree to 50. This limit guarantees decent performance in most typical situations.

Note:
If a Wireless AP is configured to serve as a scanner in Mitigator, it cannot be used in a Mesh tree. For more information, see Chapter 15, **Working with the Mitigator**.

Radio Channels

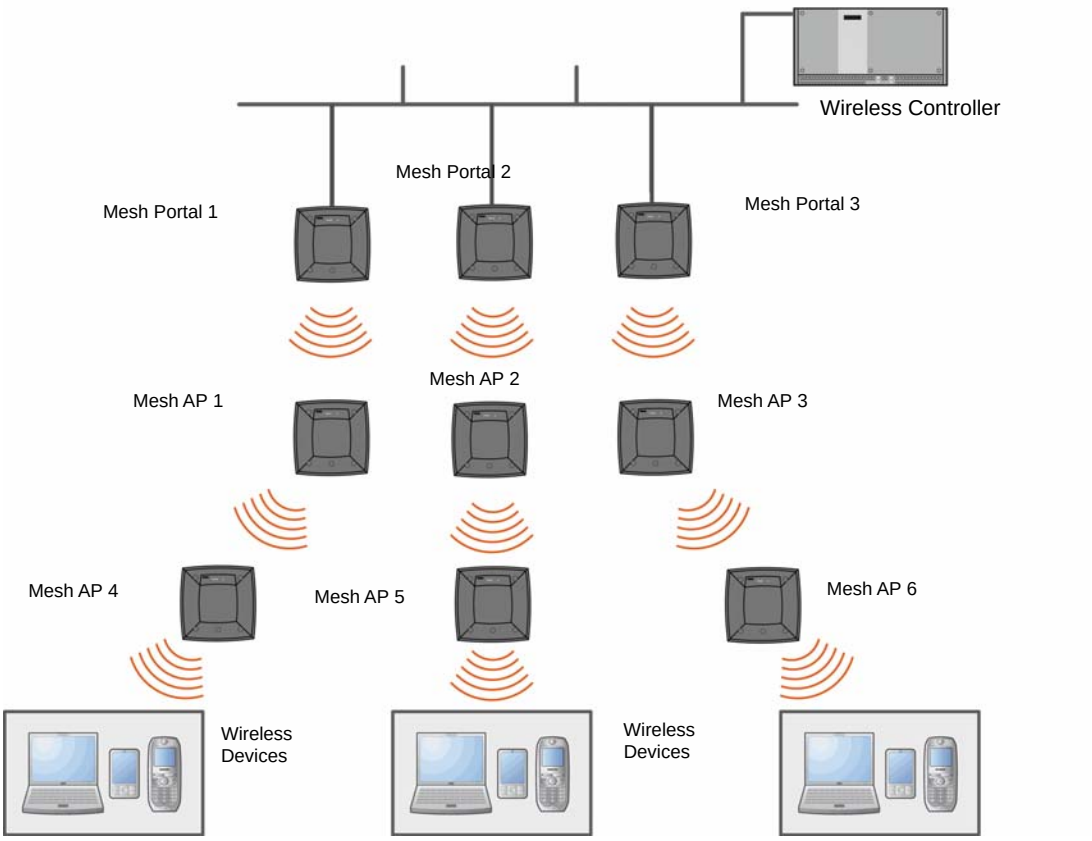
All APs in a mesh deployment must have Mesh configured on the same radio. On the backhaul radio, the following settings must be set the same way for all APs in the Mesh:

- Radio mode
- Minimum Basic Rate

Multi-Root Mesh Topology

A Mesh topology can have multiple Mesh Portals. Figure 10-9 illustrates the multiple-root Mesh topology.

Figure 10-9 Multiple-Root Mesh Topology



Link Security

The Mesh link is encrypted using Advance Encryption Standard (AES).

Note:
The keys for AES are configured prior to deploying the Repeater or Mesh APs.

Deploying the Mesh System

Before you start configuring the Mesh Wireless APs, you must ensure the following:

- The Wireless APs that are part of the wired WLAN are connected to the wired network.
- The wired Wireless APs that will serve as the Mesh Portal of the proposed Mesh topology are operating normally.
- The WLAN is operating normally.

Planning the Mesh Topology

You may sketch the proposed WLAN topology on paper before you start the Mesh deployment process. You should clearly identify the following in the sketch:

- Mesh Wireless APs with their names
- Radios that you will choose to link the Wireless APs

Provisioning the Mesh Wireless APs

This step is of crucial importance and involves connecting the Mesh Wireless APs to the enterprise network via the Ethernet link. This is done to enable the Mesh Wireless APs to connect to the SCALANCE IWLAN Controller so that they can derive their Mesh configuration.

The Mesh Wireless AP's configuration includes pre-shared key and its role, preferred parent name and the backup parent name.

Note:
The provisioning of Mesh Wireless APs must be done before they are deployed at the target location. If the Wireless APs are not provisioned, they will not work at their target location.

Mesh Deployment Overview

The following is the high-level overview of the Mesh deployment process:

1. Connecting the Mesh Wireless APs to the enterprise network via the Ethernet network to enable them to discover and register themselves with the SCALANCE IWLAN Controller. For more information, see "Discovery and Registration Overview" on page 3-9.
2. Disconnecting the Mesh Wireless APs from the enterprise network after they have discovered and registered with the SCALANCE IWLAN Controller.
3. Creating a Mesh VNS.
4. Assigning roles, parents and backup parents to the Mesh Wireless APs.
5. Assigning the Mesh APs' radios to the network VNSs.
6. Connecting the Mesh Wireless APs to the enterprise network via the Ethernet link for provisioning. For more information, see "Provisioning the Mesh Wireless APs" on page 10-11.
7. Disconnecting the Mesh Wireless APs from the enterprise network and moving them to the target location.

Note:
During the Mesh deployment process, the Mesh Wireless APs are connected to the enterprise network on two occasions — first to enable them to discover and register with the SCALANCE IWLAN Controller, and then the second time to enable them to obtain the provisioning from the SCALANCE IWLAN Controller.

Connecting the Mesh Wireless APs to the Enterprise Network for Discovery and Registration

Connect each Mesh Wireless AP to the enterprise network to enable it to discover and register itself with the SCALANCE IWLAN Controller.

Note:
Before you connect the Mesh Wireless APs to the enterprise network for discovery and registration, you must ensure that the **Security mode** property of the SCALANCE IWLAN Controller is defined according to your security needs. The **Security mode** property dictates how the SCALANCE IWLAN Controller behaves when registering new and unknown devices. For more information, see "Defining Properties for the Discovery Process" on page 3-16.
If the **Security mode** is set to **Allow only approved Wireless APs to connect** (this is also known as secure mode), you must manually approve the Mesh Wireless APs after they are connected to the network for the discovery and registration. For more information, see "Adding and Registering a Wireless AP Manually" on page 3-18.

Depending upon the number of Ethernet ports available, you may connect one or more Mesh Wireless APs at a time, or you may connect all of them together.

Once a Mesh Wireless AP has discovered and registered itself with the SCALANCE IWLAN Controller, disconnect it from the enterprise network.

Configuring the Mesh Wireless APs Through the SCALANCE IWLAN Controller

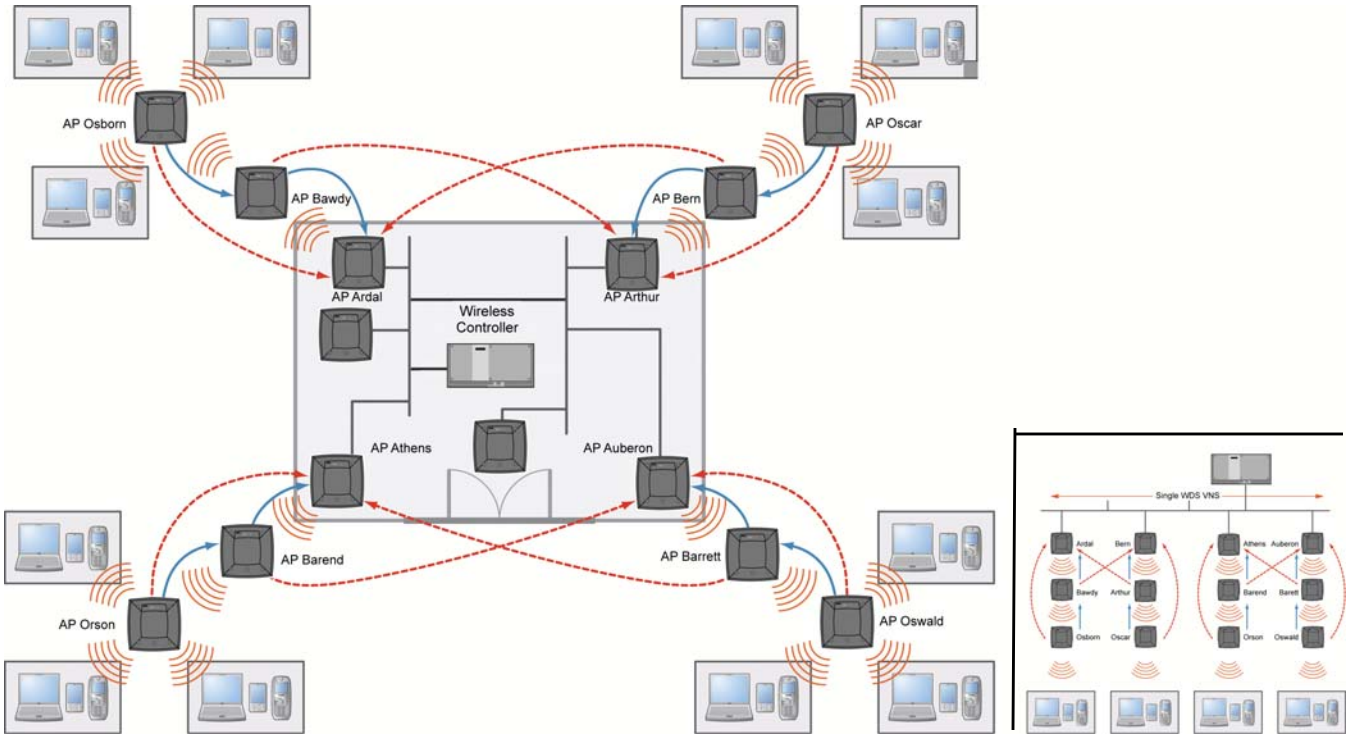
Configuring the Mesh Wireless APs involves the following steps:

1. Creating a Mesh WLAN Service.
2. Defining the SSID name and the pre-shared key.

For ease of understanding, the Mesh configuration process is explained with an example. Figure 10-10 depicts a site with the following features:

- An office building, denoted by a rectangular enclosure.
- Four Wireless APs — Ardal, Arthur, Athens and Auberon — are within the confines of the building, and are connected to the wired network.
- The space around the building is the warehouse.
- The solid arrows point toward Current Parents.
- The dotted arrows point toward Alternative Parents.

Figure 10-10 Mesh Deployment



Note:
With the single Mesh VNS, the tree structure for the Mesh deployment will be as depicted on the bottom right of Figure 10-10. You can also implement the same deployment using four Mesh VNSs, each for a set of Wireless APs in the four corners of the building. Each set of Wireless APs will form an isolated topology and will operate using a separate **SSID** and a separate **Pre-shared** key. For more information, see "Mesh WLAN Services" on page 10-4

To Configure the Mesh Wireless APs Through the SCALANCE IWLAN Controller:

Before configuring Mesh, be sure that the following conditions are met:

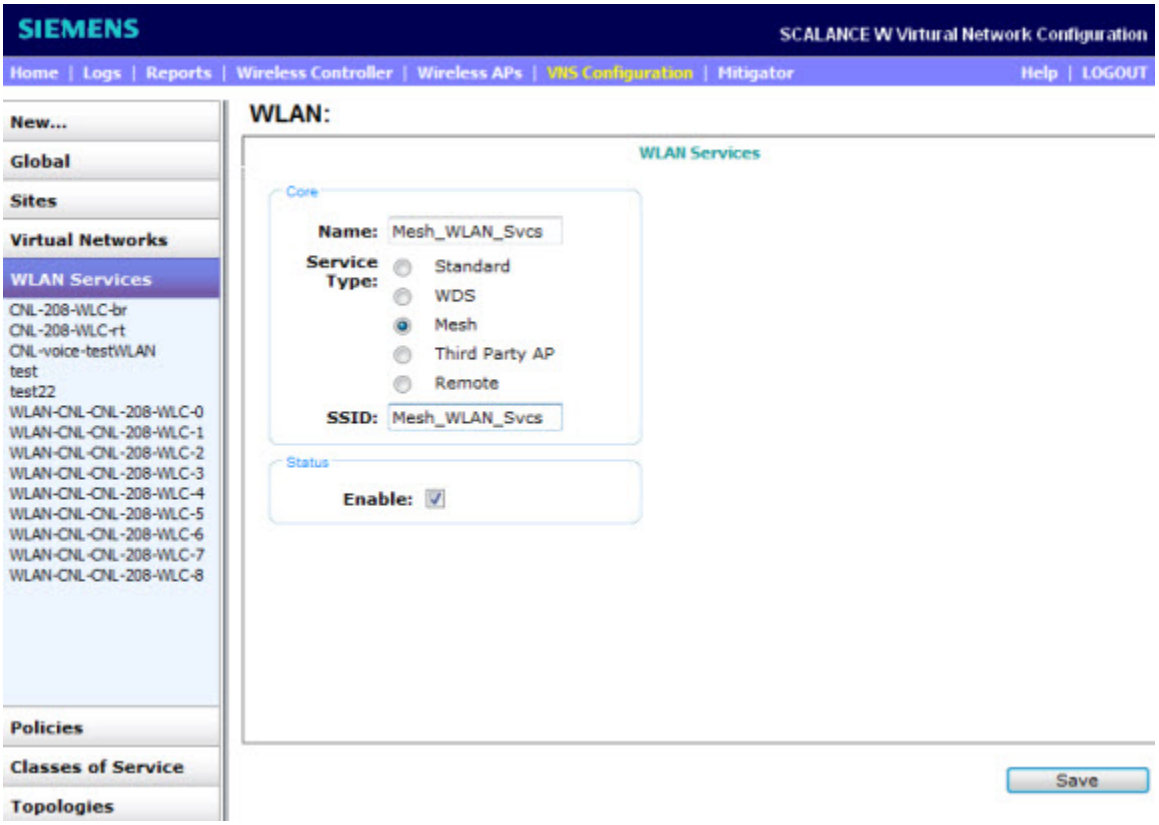
- Energy Save is set to Off
- Beacon Interval is set to 100 msec
- AP names are 32 characters or less for statistics display purposes
- ATPC and DCS are both disabled.

If possible, follow these guidelines for the backhaul radio to achieve a balance of stability, throughput, and latency:

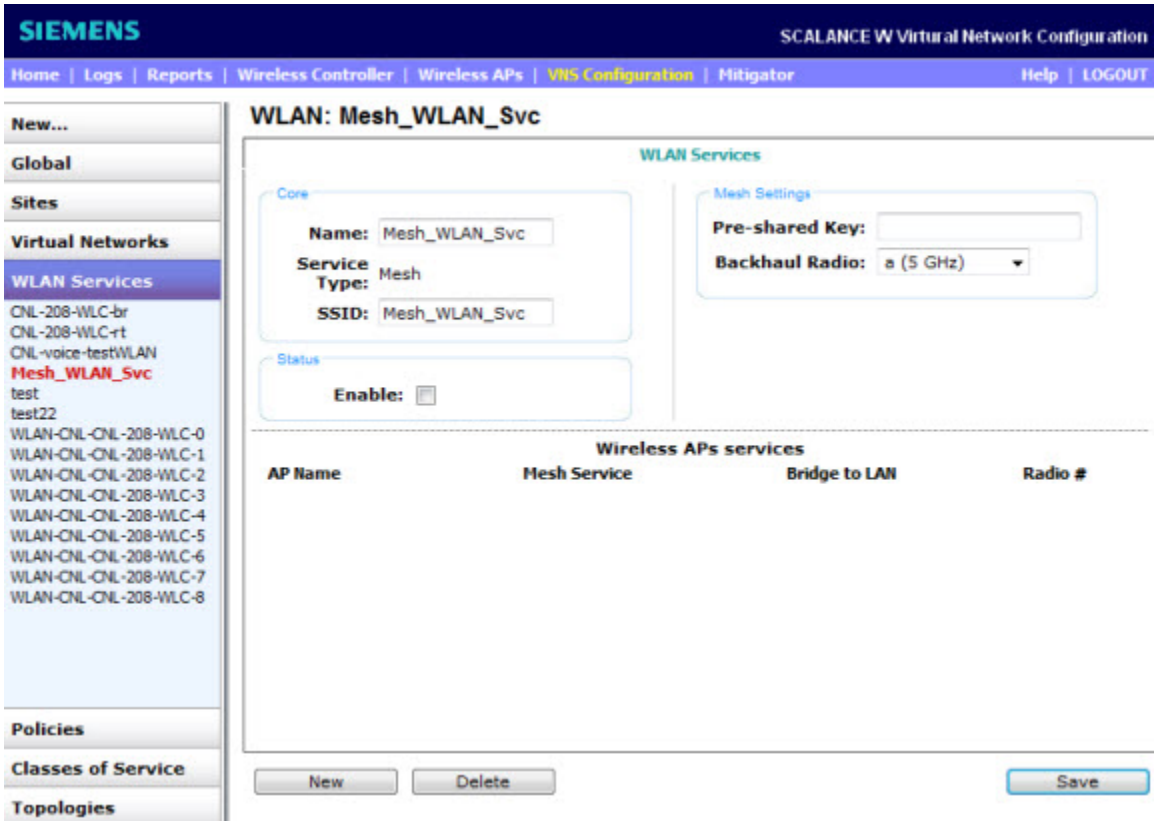
- Use a 5.2 GHz band for backhaul
- Select a non-DFS channel for the Mesh Portal
- Use a 40 MHz Channel Width and Short guard interval
- Disable Aggregate MSDUs
- Enable Aggregate MPDUs
- Enable ADDBA support

- Configure the settings on the Radio configuration page the same for all APs in the Mesh.
- Set the Poll Timeout to be at least 60 seconds.

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, expand the **WLAN Services** pane and select a Mesh service to edit or click the **New** button.
3. Enter a name for the service in the **Name** field.
4. The **SSID** field is automatically filled in with the name, but you can change it if desired.
5. For **Service Type**, select **Mesh**.



6. To save your changes, click **Save**. The WLAN configuration window is re-displayed to show additional configuration fields.



7. In the **Mesh Pre-shared Key** box, type the key.

Note:
The pre-shared key must be 8 to 63 characters long.
The Mesh Wireless APs use this pre-shared key to establish a Mesh link between them

Note:
Changing the pre-shared key after the Mesh is deployed can be a lengthy process. For more information, see “Changing the Pre-shared Key in a Mesh WLAN Service” on page 10-16.

8. Assign a backhaul radio.

Note:
After you save the configuration, you cannot change the backhaul radio. Please configure this setting wisely.

9. To save your changes, click **Save.**

Note:
The **Mesh Bridge** feature on the user interface relates to Mesh Bridge configuration. When you are configuring the Mesh Bridge topology, you must select **Mesh Bridge** for Mesh AP that is connected to the wired network. For more information, see “Wireless Bridge Configuration” on page 10-3.

Connecting the Mesh Wireless APs to the Enterprise Network for Provisioning

You must connect the Mesh Wireless APs to the enterprise network once more to enable them to obtain their configuration from the SCALANCE IWLAN Controller. The configuration includes the pre-shared key, preferred parent and backup parent. For more information, see Provisioning the Mesh Wireless APs on 10-11.

NOTICE

If you skip this step, the Mesh Wireless APs will not work at their target location.

Moving the Mesh Wireless APs to the Target Location

1. Disconnect the Mesh Wireless APs from the enterprise network, and move them to the target location.
2. Install the Mesh Wireless APs at the target location.
3. Connect the Wireless APs to a power source. The discovery and registration processes are initiated.

Note:
If you change any of the following radio properties of a Mesh Wireless AP, the Mesh Wireless AP will reject the change:
- Disabling the radio on which the Mesh link is established
- Changing the radio's Tx Power of a radio on which the Mesh link is established
- Changing the country

Changing the Pre-shared Key in a Mesh WLAN Service

To Change the Pre-shared Key in a Mesh WLAN Service

1. Create a new Mesh WLAN Service with a new pre-shared key.
2. Assign the RF of the Wireless APs from the old Mesh to the new Mesh WLAN Service.
3. Wait at least 30 seconds to ensure that all APs got the configuration, then disable the old Mesh WLAN service.
4. Check the **Mesh Statistics** report page to ensure that all the Mesh Wireless APs have connected to the SCALANCE IWLAN Controller via the new Mesh VNS. For more information, see "Viewing Statistics for APs" on page 16-2.
5. Delete the old Mesh WLAN Service. For more information, see "Deleting a VNS" on page 7-71.

11

Working with a Wireless Distribution System

This chapter describes a Wireless Distribution System (WDS), including:

For information about...	Refer to page...
About WDS	11-1
Simple WDS Configuration	11-2
Wireless Repeater Configuration	11-2
Wireless Bridge Configuration	11-3
Examples of Deployment	11-4
WDS WLAN Services	11-4
Key Features of WDS	11-7
Deploying the WDS System	11-11
Changing the Pre-shared Key in a WDS WLAN Service	11-19

About WDS

The Wireless Distribution System (WDS) enable you to expand the wireless network by interconnecting the Wireless APs through wireless links in addition to the traditional method of interconnecting Wireless APs via a wired network.

A WDS deployment is ideally suited for locations, where installing Ethernet cabling is too expensive, or physically impossible.

The WDS can be deployed in three configurations:

- Simple WDS Configuration
- Wireless Repeater Configuration
- Wireless Bridge Configuration

Simple WDS Configuration

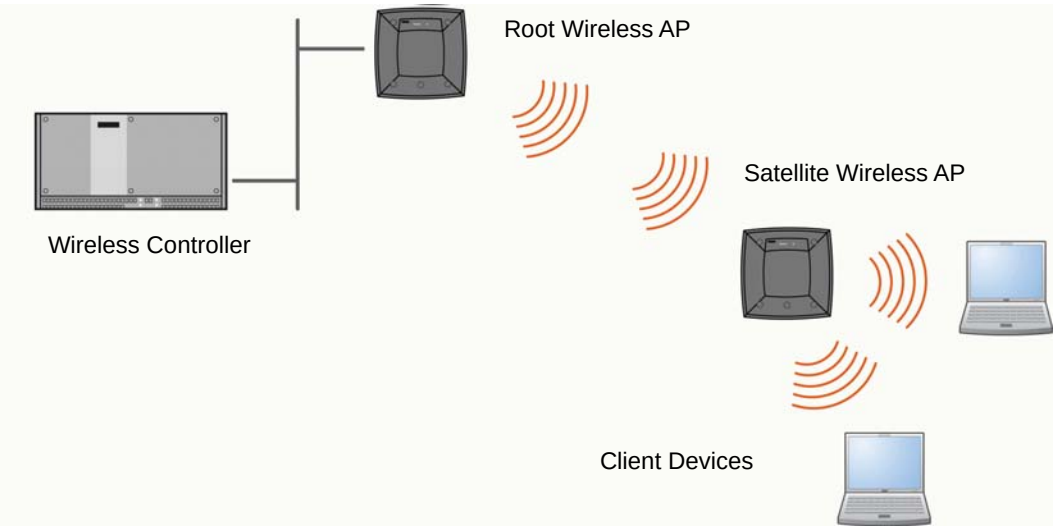
In a typical WDS configuration, the Wireless APs are connected to the distribution system via an Ethernet network, which provides connectivity to the SCALANCE IWLAN Controller.

However, when a Wireless AP is installed in a remote location and can't be wired to the distribution system, an intermediate Wireless AP is connected to the distribution system via the Ethernet link. This intermediate Wireless AP forwards and receives the user traffic from the remote Wireless AP over a radio link.

The intermediate Wireless AP that is connected to the distribution system via the Ethernet network is called Root AP, and the Wireless AP that is remotely located is called the Satellite AP.

The following figure illustrates the Simple WDS configuration:

Figure 11-1 Simple WDS Configuration

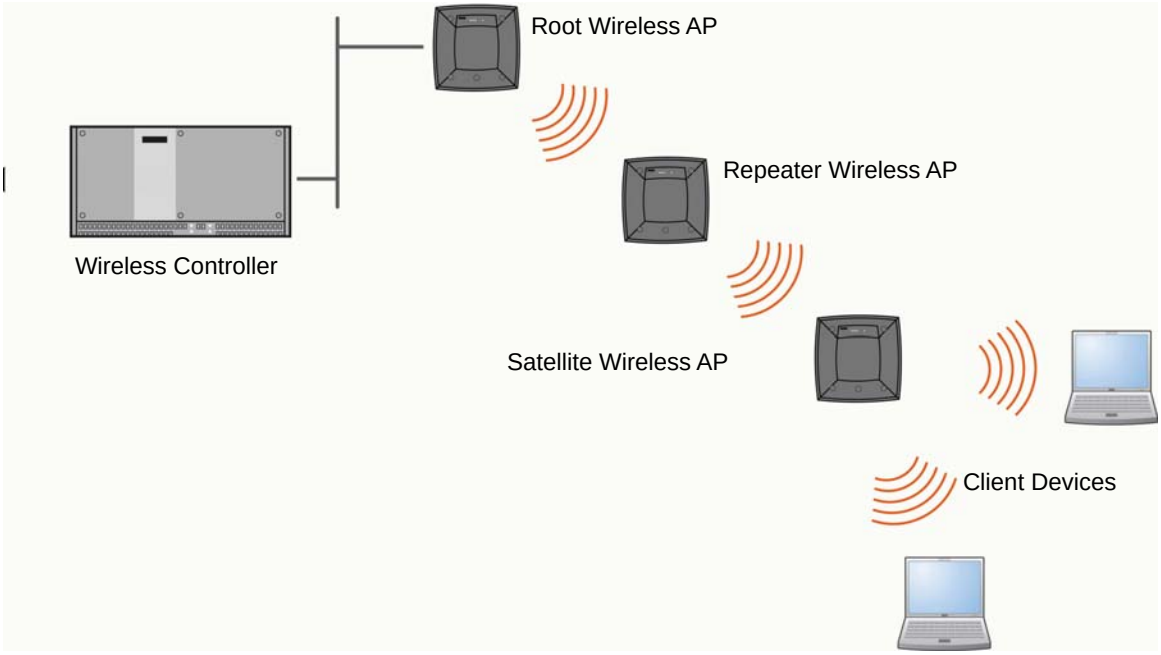


Wireless Repeater Configuration

In Wireless Repeater configuration, a Repeater Wireless AP is installed between the Root Wireless AP and the Satellite Wireless AP. The Repeater Wireless AP relays the user traffic between the Root Wireless AP and the Satellite Wireless AP. This increases the WLAN range.

The following figure illustrates the Wireless Repeater configuration:

Figure 11-2 Wireless Repeater Configuration

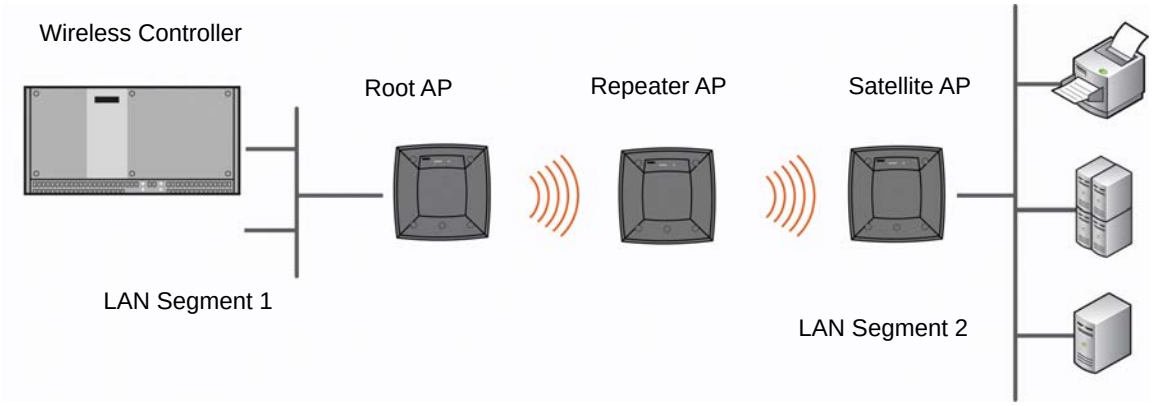


Note:
You should restrict the number of repeater hops in a Wireless Repeater configuration to three for optimum performance.

Wireless Bridge Configuration

In Wireless Bridge configuration, the traffic between two Wireless APs that are connected to two separate wired LAN segments is bridged via WDS link. You may also install a Repeater Wireless AP between the two Wireless APs connected to two separate LAN segments.

Figure 11-3 Wireless Bridge Configuration

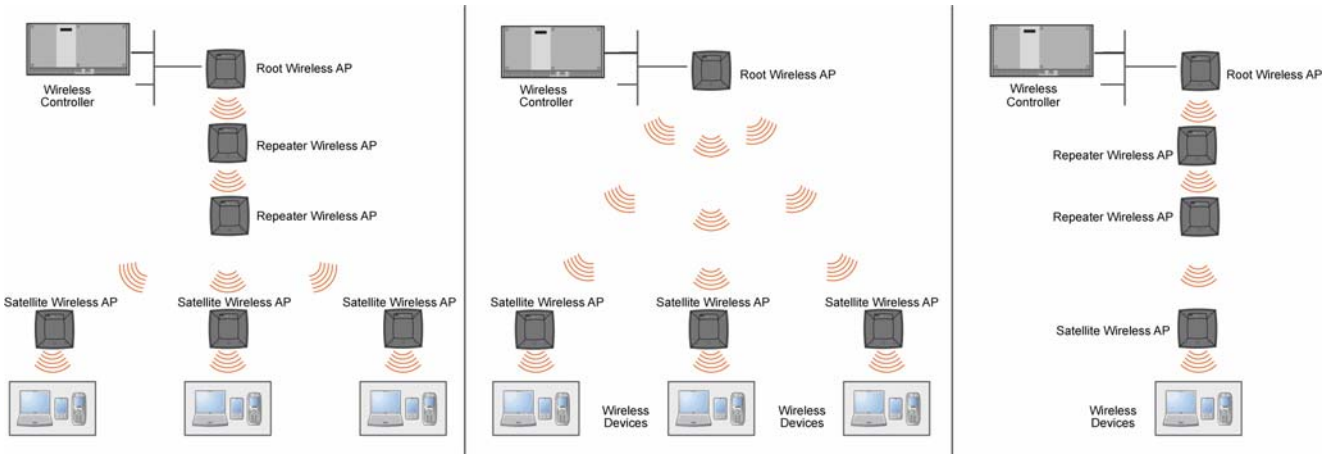


When you are configuring the Wireless Bridge configuration, you must specify on the user interface that the Satellite AP is connected to the wired LAN.

Examples of Deployment

The following illustration depicts a few examples of WDS deployment.

Figure 11-4 Examples of WDS Deployment



WDS WLAN Services

In a traditional WLAN deployment, each radio of the Wireless AP can interact with the client devices on a maximum of eight networks.

In WDS deployment, one of the radios of every WDS Wireless AP establishes a WDS link on an exclusive WLAN Service. The WDS Wireless AP is therefore limited to seven network WLAN Services on the WDS radio. The other radio can interact with the client-devices on a maximum of eight WLAN Services.

Note:
The Root Wireless AP and the Repeater Wireless APs can also be configured to interact with the client-devices. For more information, see “Assigning the Satellite Wireless APs’ Radios to the Network WLAN Services” on page 11-17.

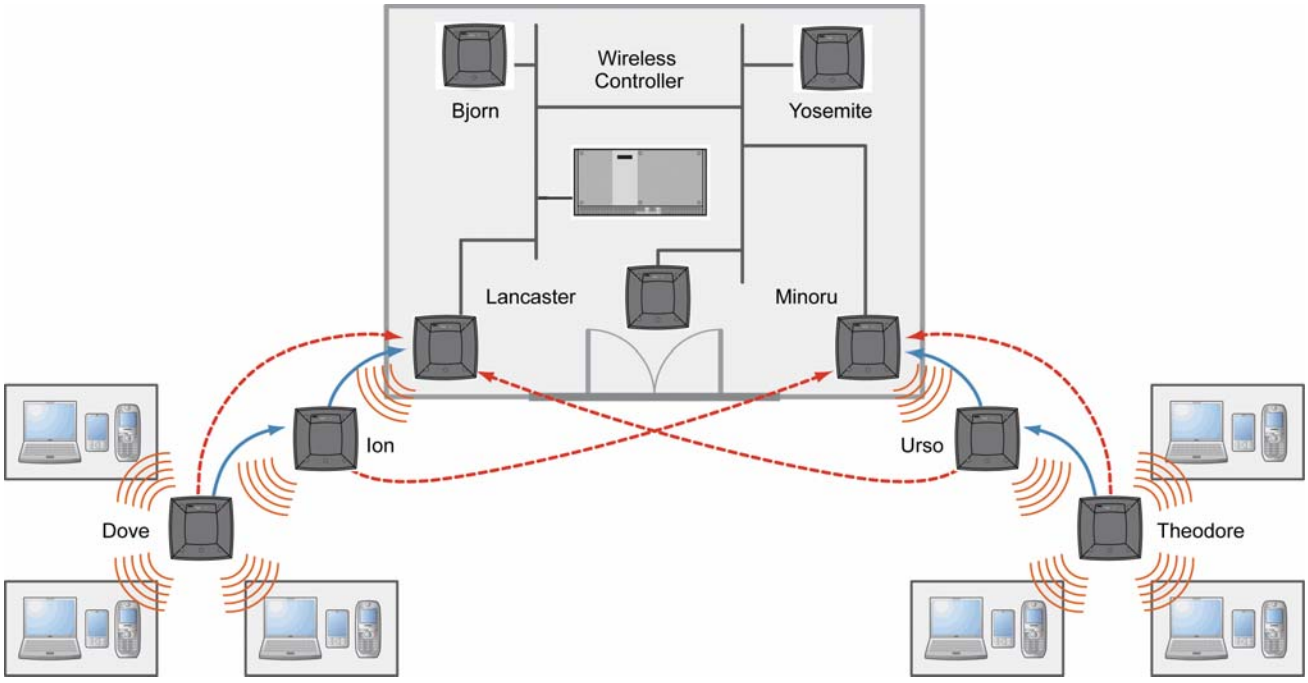
The WLAN Service on which the Wireless APs establish the WDS link is called the WDS WLAN Service.

A WDS can be setup either by using either a single WDS WLAN Service or multiple WDS WLAN Services. The following figures illustrate the point.

Figure 11-5 on page 11-5:

- The rectangular enclosure denotes an office building.
- The four Wireless APs — Minoru, Yosemite, Bjorn and Lancaster — are within the confines of the building and are connected to the wired network.
- The space around the office building is a ware house.
- The solid arrows point towards Preferred Parents.
- The dotted arrows point towards Backup Parents.

Figure 11-5 Deployment Example

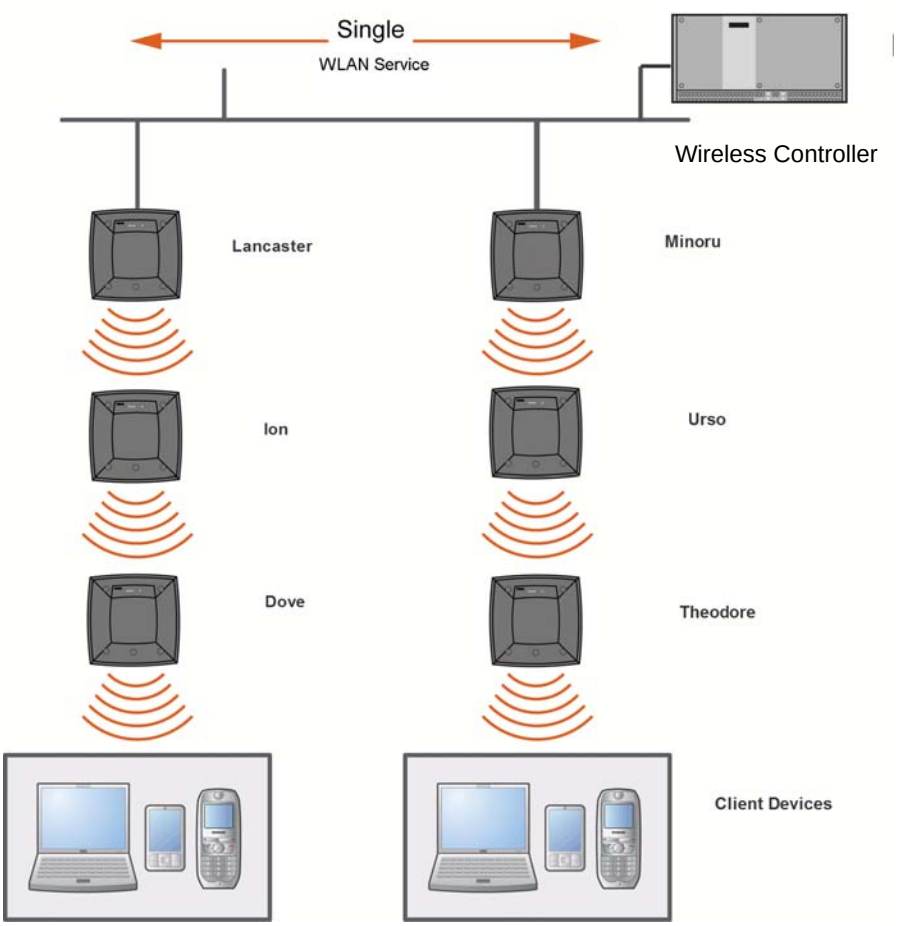


WDS Setup with a Single WDS WLAN Service

Deploying the WDS for the above example using a single WDS WLAN Service results in the following structure.

The tree will operate as a single WDS entity. It will have a single WDS SSID and a single pre-shared key for WDS links. This tree will have multiple roots. For more information, see "Multi-Root WDS Topology" on page 11-10.

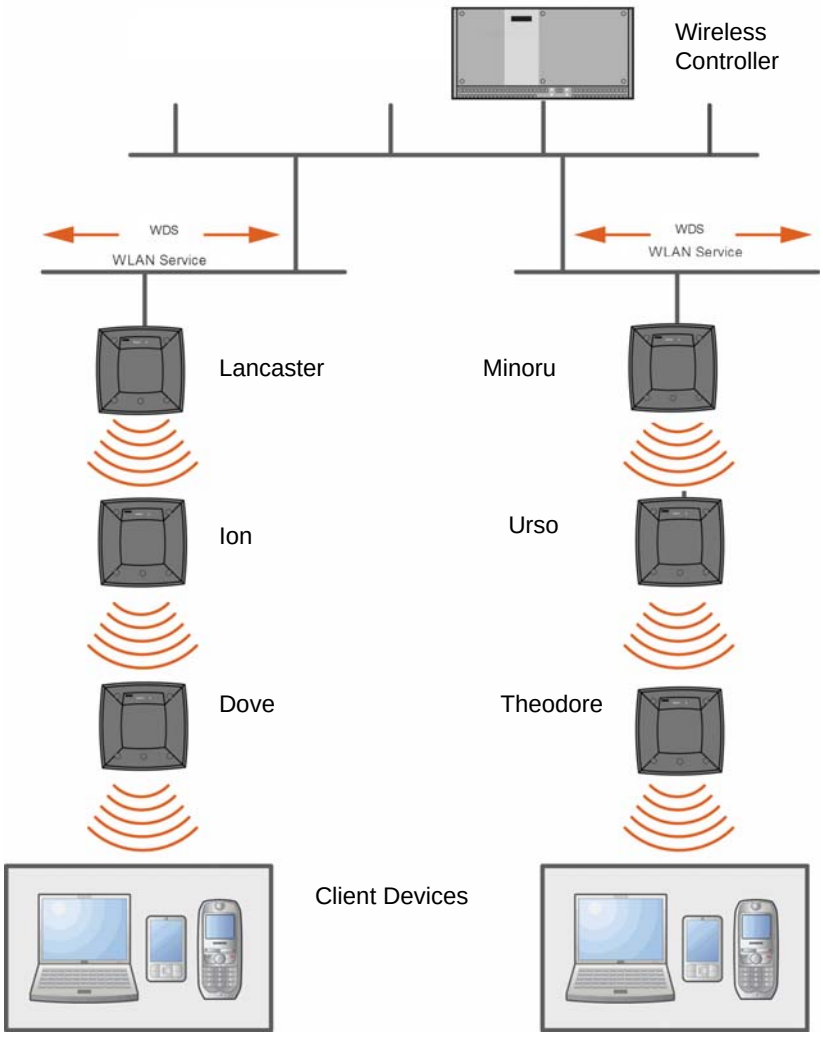
Figure 11-6 WDS Setup with a Single WDS WLAN Service



WDS Setup with Multiple WDS WLAN Services

You can also deploy the same WDS in Figure 11-5 using two WDS WLAN Services. The Two WDS WLAN Services will create two independent WDS trees. Both the trees will operate on separate SSIDs and use separate pre-shared keys.

Figure 11-7 WDS Setup with Multiple WDS WLAN Services



Key Features of WDS

Some key features of WDS are:

- Tree-like Topology
- Radio Channels
- Multi-Root WDS Topology
- Automatic Discovery of Parent and Backup Parent Wireless APs
- Link Security

Tree-like Topology

The Wireless APs in WDS configuration can be regarded as nodes, and these nodes form a tree-like structure. The tree builds in a top down manner with the Root Wireless AP being the tree root, and the Satellite Wireless AP being the tree leaves.

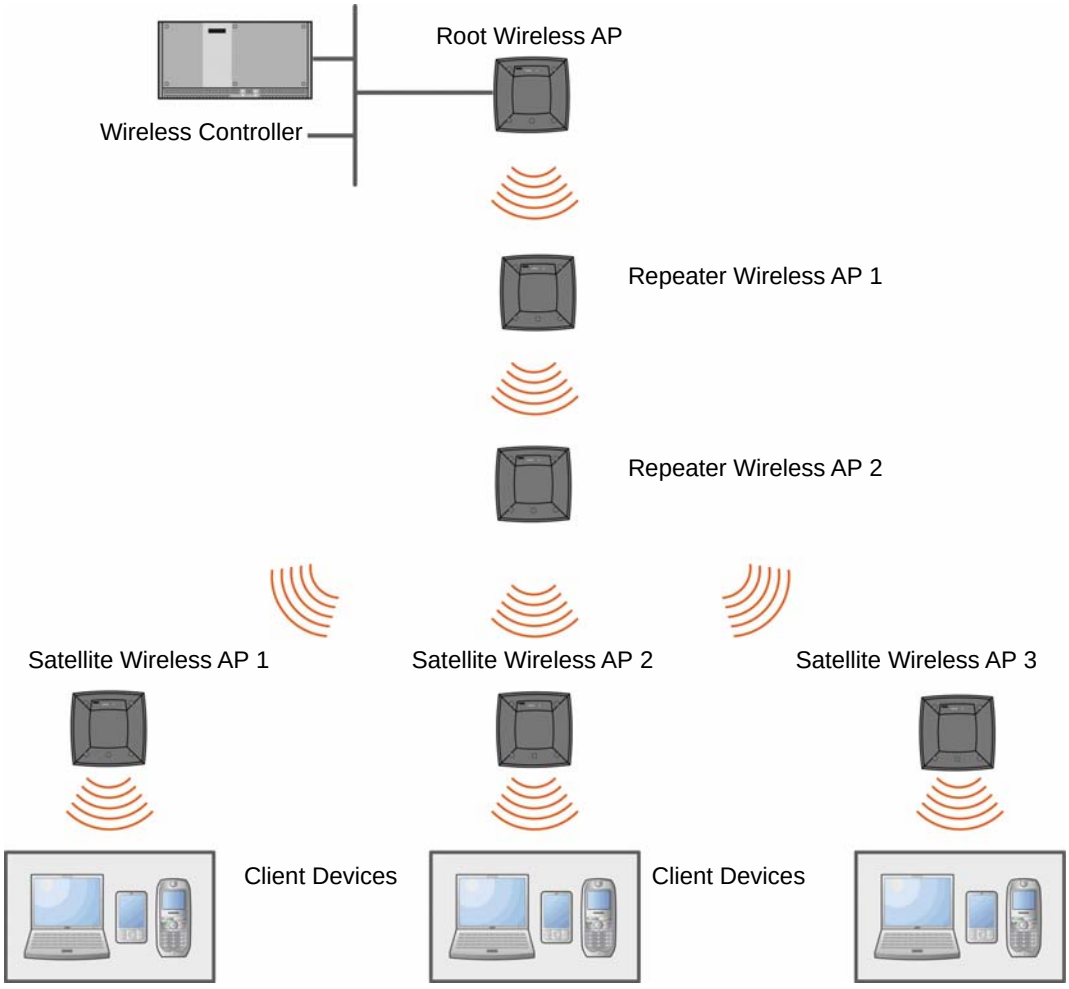
The nodes in the tree-structure have a parent-child relationship. The Wireless AP that provides the WDS service to the other Wireless APs in the downstream direction is a parent. The Wireless APs that establish a link with the Wireless AP in the upstream direction for WDS service are children.

Note:
If a parent Wireless AP fails or stops to act a parent, the children Wireless APs will attempt to discover their backup parents. If the backup parents are not defined, the children Wireless APs will be left stranded.

The following figure illustrates the parent-child relationship between the nodes in a WDS topology. In Figure 11-8:

- Root Wireless AP is the parent of Repeater Wireless AP 1.
- Repeater Wireless AP 1 is the child of Root Wireless AP.
- Repeater Wireless AP 1 is the parent of Repeater Wireless AP 2.
- Repeater Wireless AP 2 is the child of Repeater Wireless AP 1.
- Repeater Wireless AP 2 is the parent of the following Wireless APs:
  - Satellite Wireless AP 1
  - Satellite Wireless AP 2
  - Satellite Wireless AP 3
- All the three Satellite APs are the children of Repeater Wireless AP 2.

Figure 11-8 Parent-Child Relationship Between Wireless APs in WDS Configuration



The WDS system enables you to configure the Wireless AP's role — **parent**, **child** or **both** — from the SCALANCE IWLAN Controller's interface. If the WDS Wireless AP will be serving as a parent and a child in a given topology, its role is configured as **both**.

Note:
Siemens recommends that you limit the number of APs participating in a WDS tree to 8. This limit guarantees decent performance in most typical situations.

Note:
If a Wireless AP is configured to serve as a scanner in Mitigator, it cannot be used in a WDS tree. For more information, see Chapter 15, **Working with the Mitigator**.

Radio Channels

The radio channel on which the child Wireless AP operates is determined by the parent Wireless AP.

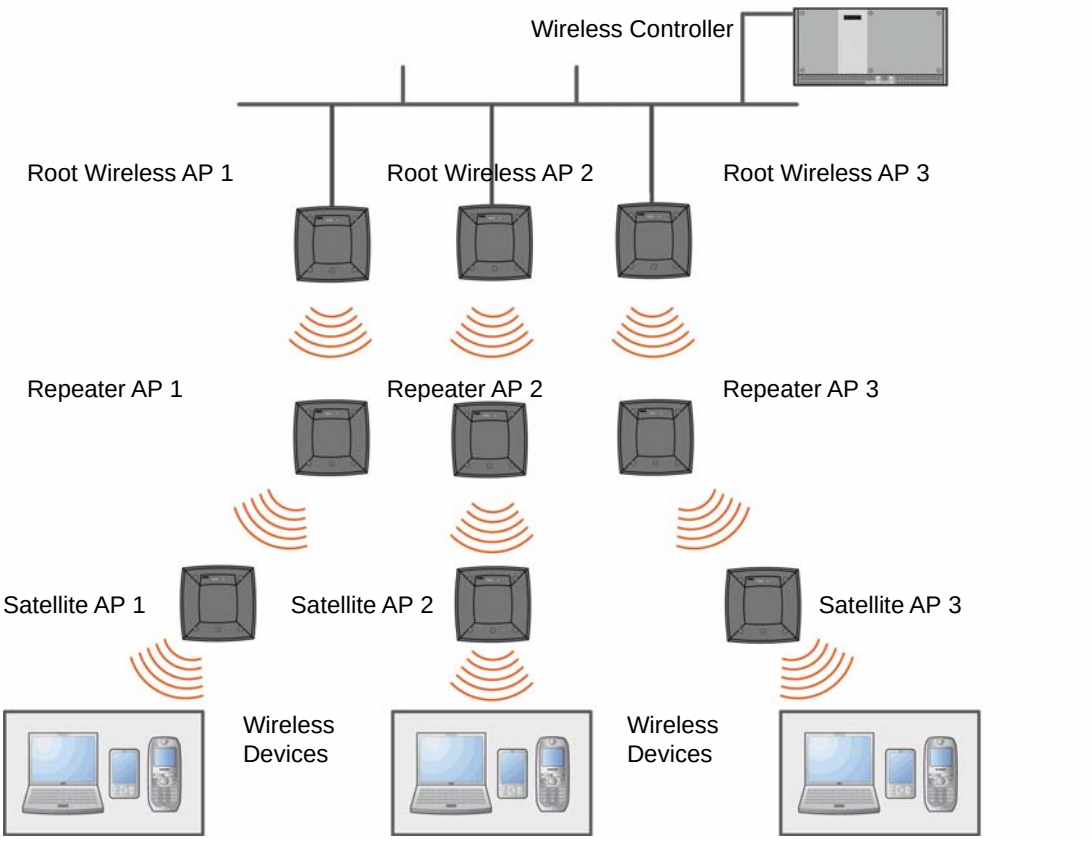
A Wireless AP may connect to its parent Wireless AP and children Wireless APs on the same radio, or on different radios. Similarly, a Wireless AP can have two children operating on two different radios.

Note:
When a Wireless AP is connecting to its parent Wireless AP and children APs on the same radio, it uses the same channel for both the connections.

Multi-Root WDS Topology

A WDS topology can have multiple Root Wireless APs. Figure 11-9 illustrates the multiple-root WDS topology.

Figure 11-9 Multiple-root WDS Topology



Automatic Discovery of Parent and Backup Parent Wireless APs

The children Wireless APs, including the Repeater Wireless AP and the Satellite Wireless APs, scan for their respective parents at a startup.

You can manually configure a parent and backup parent for the children Wireless APs or you can enable the children Wireless APs to automatically select the best parent out of all of the available APs. If you choose automatic parent Wireless AP selection, a child Wireless AP selects a parent Wireless AP based on its received signal strength and the number of hops to the root Wireless AP. After a parent Wireless AP and backup parent Wireless AP is selected, the Wireless controller will first try to negotiate a WDS link with the parent Wireless controller. If the WDS link negotiation is unsuccessful, the Wireless controller will try to negotiate a link with the backup parent.

Link Security

The WDS link is encrypted using Advance Encryption Standard (AES).

Note:
The keys for AES are configured prior to deploying the Repeater or Satellite Wireless APs.

Deploying the WDS System

Before you start configuring the WDS Wireless APs, you must ensure the following:

- The Wireless APs that are part of the wired WLAN are connected to the wired network.
- The wired Wireless APs that will serve as the Root AP/Root APs of the proposed WDS topology are operating normally.
- The WLAN is operating normally.

Planning the WDS Topology

You may sketch the proposed WLAN topology on paper before you start the WDS deployment process. You should clearly identify the following in the sketch:

- WDS Wireless APs with their names
- Parent-child relationships between Wireless APs
- Radios that you will choose to link the Wireless AP's parents and children

Provisioning the WDS Wireless APs

This step is of crucial importance and involves connecting the WDS Wireless APs to the enterprise network via the Ethernet link. This is done to enable the WDS Wireless APs to connect to the SCALANCE IWLAN Controller so that they can derive their WDS configuration.

The WDS Wireless AP's configuration includes pre-shared key, its role, preferred parent name and the backup parent name.

Note:
The provisioning of WDS Wireless APs must be done before they are deployed at the target location. If the Wireless APs are not provisioned, they will not work at their target location.

WDS Deployment Overview

The following is the high-level overview of the WDS deployment process:

1. Connecting the WDS Wireless APs to the enterprise network via the Ethernet network to enable them to discover and register themselves with the SCALANCE IWLAN Controller. For more information, see "Discovery and Registration Overview" on page 3-9.
2. Disconnecting the WDS Wireless APs from the enterprise network after they have discovered and registered with the SCALANCE IWLAN Controller.
3. Creating a WDS VNS.
4. Assigning roles, parents and backup parents to the WDS Wireless APs.

5. Assigning the Satellite Wireless APs' radios to the network VNSs.
6. Connecting the WDS Wireless APs to the enterprise network via the Ethernet link for provisioning. For more information, see "Provisioning the WDS Wireless APs" on page 11-11.
7. Disconnecting the WDS Wireless APs from the enterprise network and moving them to the target location.

Note:
During the WDS deployment process, the WDS Wireless APs are connected to the enterprise network on two occasions — first to enable them to discover and register with the SCALANCE IWLAN Controller, and then the second time to enable them to obtain the provisioning from the SCALANCE IWLAN Controller.

Connecting the WDS Wireless APs to the Enterprise Network for Discovery and Registration

Connect each WDS Wireless AP to the enterprise network to enable it to discover and register itself with the SCALANCE IWLAN Controller.

Note:
Before you connect the WDS Wireless APs to the enterprise network for discovery and registration, you must ensure that the **Security mode** property of the SCALANCE IWLAN Controller is defined according to your security needs. The **Security mode** property dictates how the SCALANCE IWLAN Controller behaves when registering new and unknown devices. For more information, see "Defining Properties for the Discovery Process" on page 3-16.
If the **Security mode** is set to **Allow only approved** Wireless AP**s to connect** (this is also known as secure mode), you must manually approve the WDS Wireless APs after they are connected to the network for the discovery and registration. For more information, see "Adding and Registering a Wireless AP Manually" on page 3-18.

Depending upon the number of Ethernet ports available, you may connect one or more WDS Wireless APs at a time, or you may connect all of them together.

Once a WDS Wireless AP has discovered and registered itself with the SCALANCE IWLAN Controller, disconnect it from the enterprise network.

Configuring the WDS Wireless APs Through the SCALANCE IWLAN Controller

Configuring the WDS Wireless APs involves the following steps:

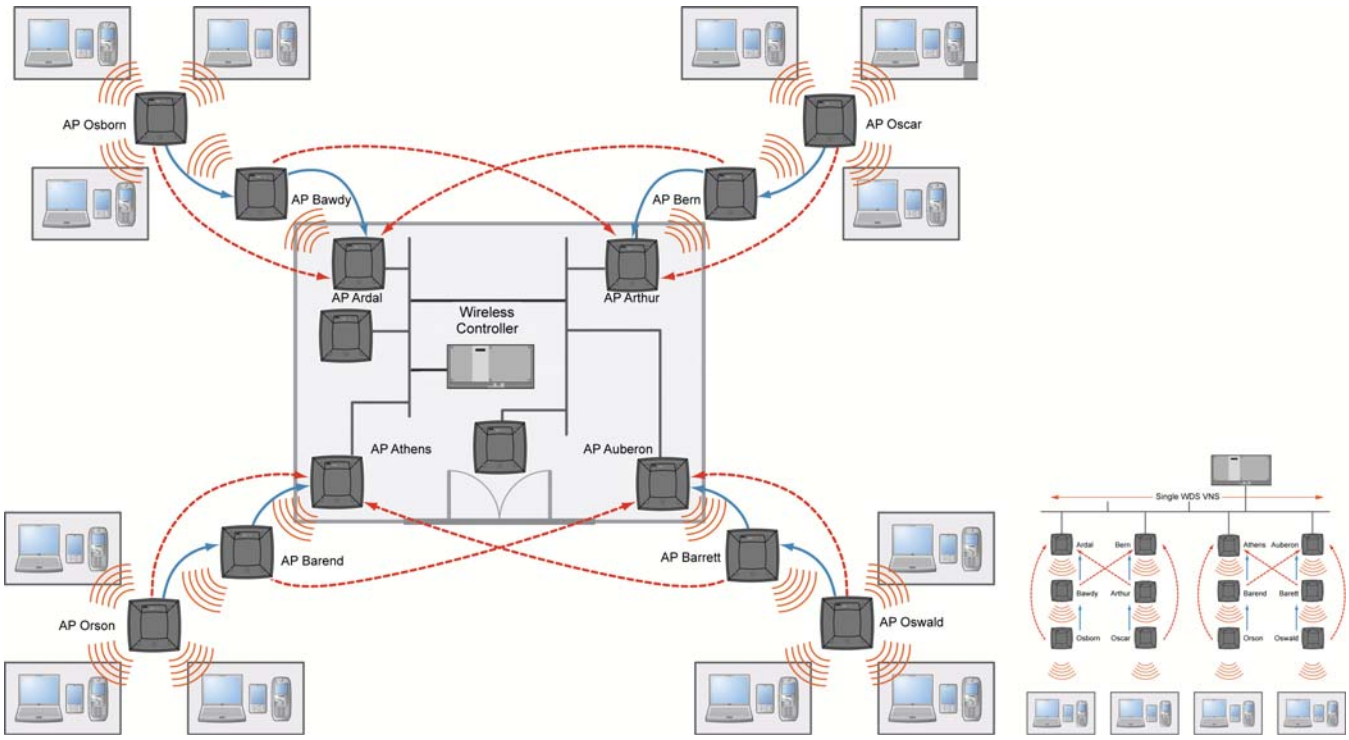
1. Creating a WDS WLAN Service.
2. Defining the SSID name and the pre-shared key.
3. Assigning roles, parents and backup parents to the WDS Wireless APs.

For ease of understanding, the WDS configuration process is explained with an example. Figure 11-10 depicts a site with the following features:

- An office building, denoted by a rectangular enclosure.
- Four Wireless APs — Ardal, Arthur, Athens and Auberon — are within the confines of the building, and are connected to the wired network.
- The space around the building is the warehouse.
- The solid arrows point toward Preferred Parents.

- The dotted arrows point toward Backup Parents.

Figure 11-10 WDS Deployment



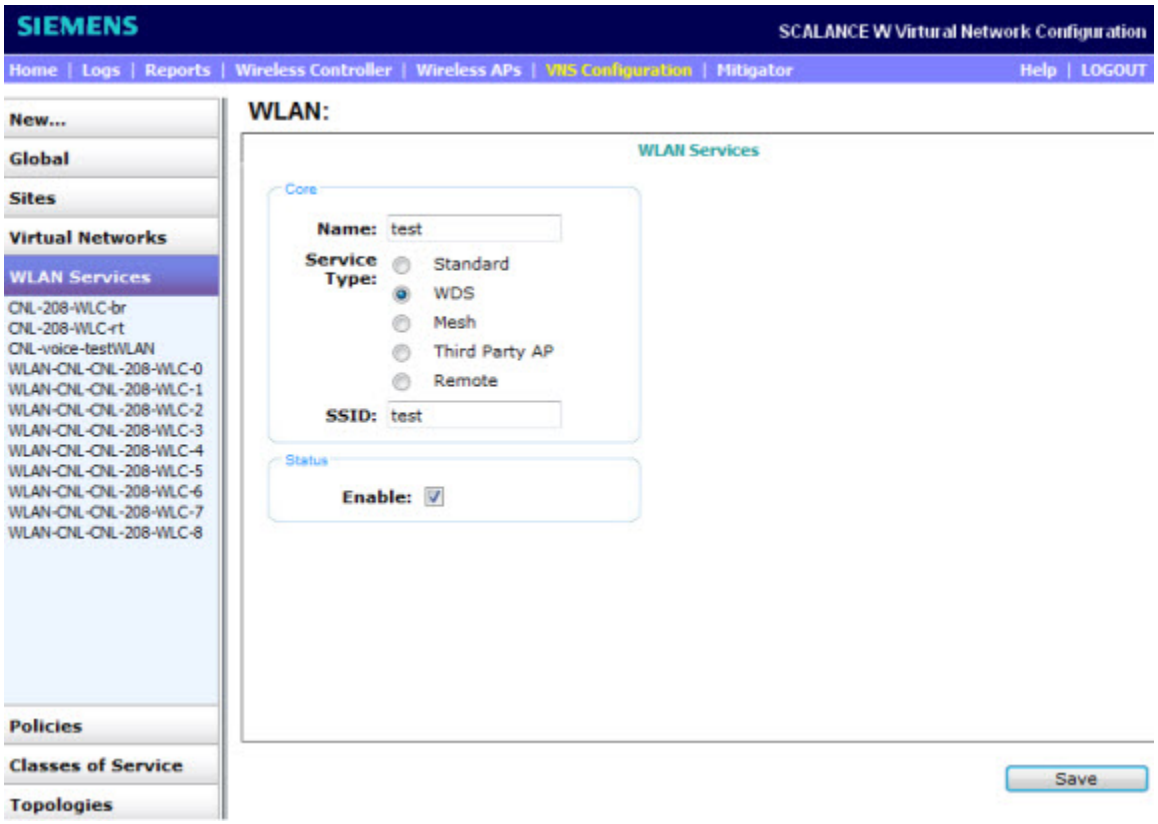
Note:
With the single WDS VNS, the tree structure for the WDS deployment will be as depicted on the bottom right of Figure 11-10. You can also implement the same deployment using four WDS VNSs, each for a set of Wireless APs in the four corners of the building. Each set of Wireless APs will form an isolated topology and will operate using a separate **SSID** and a separate **Pre-shared** key. For more information, see "WDS WLAN Services" on page 11-4.

To Configure the WDS Wireless APs Through the SCALANCE IWLAN Controller:

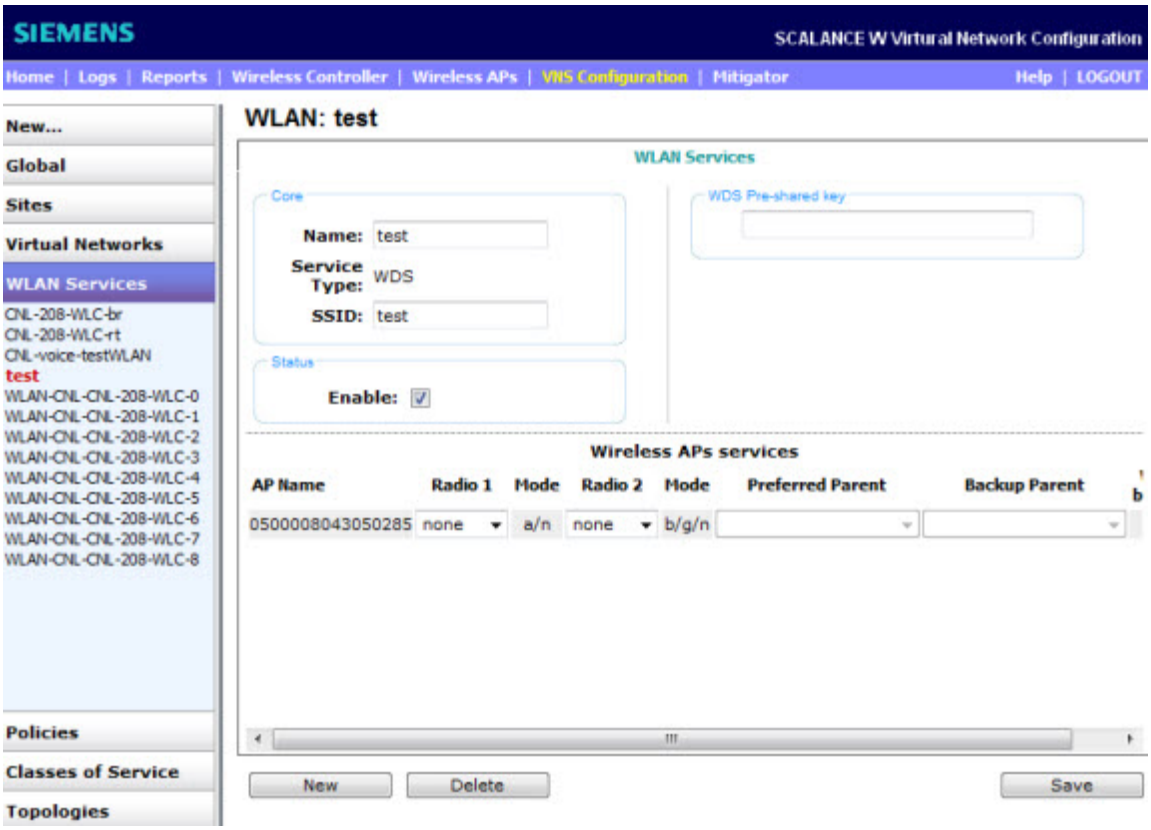
Note:
You must identify and mark the Preferred Parents, Backup Parents and the Child Wireless APs in the proposed WDS topology before starting the configuration process.

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, expand the **WLAN Services** pane and select a WDS service to edit or click the **New** button.
3. Enter a name for the service in the **Name** field.
4. The **SSID** field is automatically filled in with the name, but you can change it if desired.

5. For **Service Type**, select **WDS**.



6. To save your changes, click **Save**. The WLAN configuration window is re-displayed to show additional configuration fields.



7. In the **WDS Pre-shared Key** box, type the key.

Note:
The pre-shared key must be 8 to 63 characters long.
The WDS Wireless APs use this pre-shared key to establish a WDS link between them.

Note:
Changing the pre-shared key after the WDS is deployed can be a lengthy process. For more information, see "Changing the Pre-shared Key in a WDS WLAN Service" on page 11-19.

8. Assign the roles, preferred parents and backup parents to the Wireless AP Radios.

Note:
The roles — **parent**, **child**, and **both** — are assigned to the Radios of the Wireless APs. A Wireless AP may connect to its parent Wireless AP and children Wireless APs on the same Radio, or on a different Radio. Similarly, a Wireless AP can have two children operating on two different Radios.
The Radio on which the child Wireless AP operates is determined by the parent Wireless AP.
If the Wireless AP will be serving both as parent and child, you must select **both** as its role.

To configure the WDS as illustrated in Figure 11-10 with a single WDS VNS, you must assign the roles, preferred parents and backup parents to the Wireless APs according to Table 11-1.

Table 11-1 Wireless APs and Their Roles

Wireless AP	Radio b/g	Radio a	Preferred Parent	Backup Parent
Ardal	Parent	Parent	See the note below.	See the note below.
Arthur	Parent	Parent	See the note below.	See the note below.
Athens	Parent	Parent	See the note below.	See the note below.
Auberon	Parent	Parent	See the note below.	See the note below.
Bawdy	Both	Child	Ardal	Arthur
Bern	Both	Child	Arthur	Ardal
Barend	Both	Child	Athens	Auberon
Barett	Both	Child	Auberon	Athens
Osborn	Child	Child	Bawdy	Ardal
Oscar	Child	Child	Bern	Arthur
Orson	Child	Child	Barend	Athens
Oswald	Child	Child	Barett	Auberon

Note:
Since the Root Wireless APs — Ardal, Arthur, Athens and Auberon —are the highest entities in the tree structure, they do not have parents. Therefore, the **Preferred Parent** and **Backup Parent** drop-down lists of the Root Wireless APs do not display any Wireless AP. You must leave these two fields blank.

Note:
You must first assign the 'parent' role to the Wireless APs that will serve as the parents. Unless this is done, the Parent Wireless APs will not be displayed in the **Preferred Parent** and **Backup Parent** drop-down lists of other Wireless APs.

Note:
The **WDS Bridge** feature on the user interface relates to WDS Bridge configuration. When you are configuring the WDS Bridge topology, you must select **WDS Bridge** for Satellite Wireless AP that is connected to the wired network. For more information, see "Wireless Bridge Configuration" on page 11-3.

To assign the roles, preferred parent and backup parent:

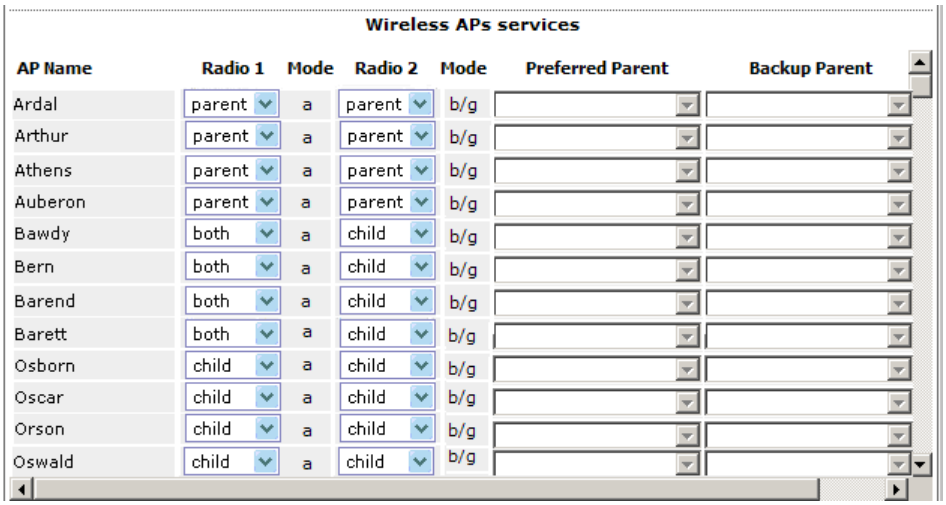
a. From the radio **b/g** drop-down list of the Root Wireless APs — Ardal, Arthur, Athens and Auberon, click **Parent**.

b. From the radio **a** drop-down list of the Root Wireless APs — Ardal, Arthur, Athens and Auberon, click **Parent.**

c. From the radio **a** and radio **b/g** drop-down list of other Wireless APs, click the roles according to Table 11-1.

d. From the **Preferred Parent** drop-down list of other Wireless APs, click the parents according to Table 11-1.

e. From the **Backup Parent** drop-down list of other Wireless APs, click the backup parents according to Table 11-1.



9. To save your changes, click **Save**.

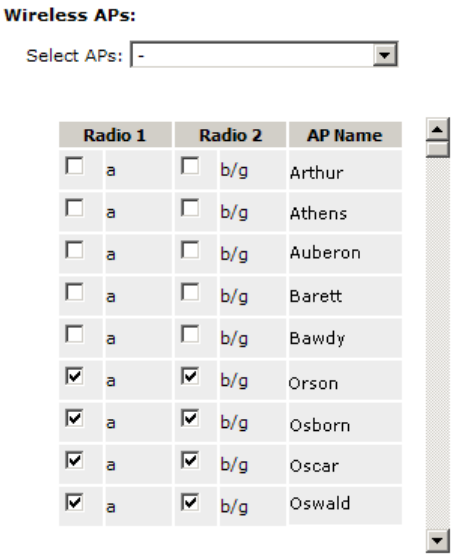
Assigning the Satellite Wireless APs' Radios to the Network WLAN Services

You must assign the Satellite Wireless APs' radios to the network WLAN Services.

Note:
Network WLAN Services are the typical WLAN Services on which the Wireless APs service the client devices: **Routed**, **Bridge Traffic Locally at WLC**, and **Bridge Traffic Locally at AP**. For more information, see "VNS Global Settings" on page 7-3.

To Assign the Satellite Wireless APs' Radios to the Network WLAN Service:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, expand the **WLAN Services** pane and select a network WDS service to edit



3. In the **Wireless APs** list, select the radios of the Satellite APs — Osborn, Oscar, Orson and Oswald.

Note:
If you want the Root Wireless AP and the Repeater Wireless APs to service the client devices, you must select their radios in addition to the radios of the Satellite Wireless APs.

4. To save your changes, click **Save**.
5. Log out from the SCALANCE IWLAN Controller.

Connecting the WDS Wireless APs to the Enterprise Network for Provisioning

You must connect the WDS Wireless APs to the enterprise network once more to enable them to obtain their configuration from the SCALANCE IWLAN Controller. The configuration includes the pre-shared key, preferred parent and backup parent. For more information, see Provisioning the WDS Wireless APs on 11-11.

NOTICE

Warning: If you skip this step, the WDS WWireless APs will not work at their target location.

Moving the WDS Wireless APs to the Target Location

1. Disconnect the WDS Wireless APs from the enterprise network, and move them to the target location.
2. Install the WDS Wireless APs at the target location.
3. Connect the Wireless APs to a power source. The discovery and registration processes are initiated.

Note:
If you change any of the following configuration parameters of a WDS Wireless AP, the WDS Wireless AP will reject the change:
• Reassigning the WDS Wireless AP's role from **Child** to **None**
• Reassigning the WDS Wireless AP's role from **Both** to **Parent**
• Changing the **Preferred Parent** of the WDS Wireless AP
However, the SCALANCE IWLAN Controller will display your changes, as these changes will be saved in the database. To enable the WDS Wireless AP to obtain your changes, you must remove it from the WDS location and then connect it to the SCALANCE IWLAN Controller via the wired network.

Note:
If you change any of the following radio properties of a WDS Wireless AP, the WDS Wireless AP will reject the change:
• Disabling the radio on which the WDS link is established
• Changing the radio's Tx Power of a radio on which the WDS link is established
• Changing the country

Changing the Pre-shared Key in a WDS WLAN Service

To Change the Pre-shared Key in a WDS WLAN Service

1. Create a new WDS WLAN Service with a new pre-shared key.
2. Assign the RF of the Wireless APs from the old WDS to the new WDS WLAN Service.
3. Check the **WDS** Wireless AP **Statistics** report page to ensure that all the WDS Wireless APs have connected to the SCALANCE IWLAN Controller via the new WDS VNS. For more information, see "Viewing Statistics for APs" on page 16-2.
4. Delete the old WDS WLAN Service. For more information, see "Deleting a VNS" on page 7-71.

12

Availability and Session Availability

This chapter describes the availability feature, including:

For information about...	Refer to page...
Availability	12-1
Session Availability	12-9
Viewing SLP Activity	12-19
Viewing SLP Activity	12-19

Availability

The SCALANCE IWLAN Controller Software system provides the availability feature to maintain service availability in the event of a SCALANCE IWLAN Controller outage.

Note:
During the failover event, the maximum number of failover APs the secondary controller can accommodate is equal to the maximum number of APs supported by the hardware platform.

Wireless APs that attempt to connect to the secondary controller during a failover event are assigned to the WLAN Service that is defined in the system's default AP configuration, provided the administrator has not assigned the failover Wireless APs to one or more VNSs. If a system default AP configuration does not exist for the controller (and the administrator has not assigned the failover Wireless APs to any WLAN Service), the APs will not be assigned to any WLAN Service during the failover.

A SCALANCE IWLAN Controller will not accept a connection by a foreign AP if the SCALANCE IWLAN Controller believes its availability partner controller is in service.
Also, the default Wireless AP configuration assignment is only applicable to new APs that failover to the backup controller. Any Wireless AP that has previously failed over and is already known to the backup system will receive the configuration already present on that system. For more information, see "Configuring the Default Wireless AP Settings" on page 3-53.

During the failover event when the Wireless AP connects to the secondary controller, the users are disassociated from the Wireless AP. Consequently, the users must log on again and be authenticated on the secondary controller before the wireless service is restored.

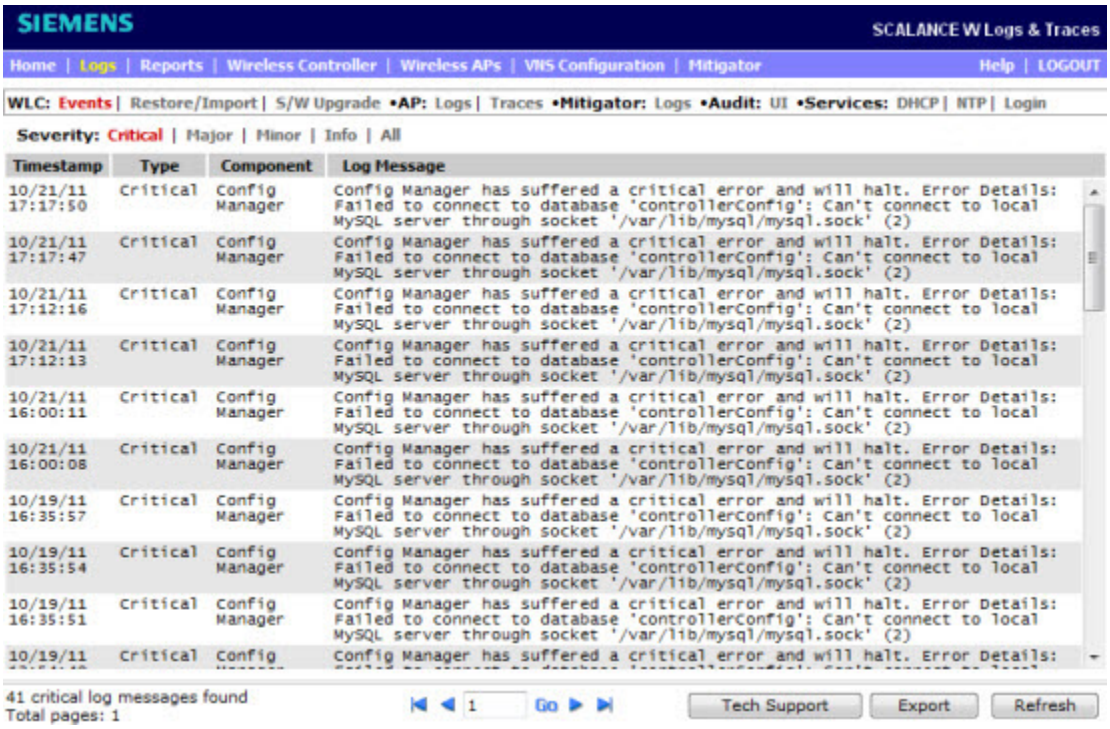
Note:
If you want the mobile user's session to be maintained, you must use the 'session availability' feature that enables the primary controller's Wireless APs to failover to the secondary controller fast enough to maintain the session availability (user session). For more information, see "Session Availability" on page 12-9.

The availability feature provides Wireless APs with a list of local active interfaces for the active controller as well as the active interfaces for the backup controller. The list is sorted by top-down priority.

If the connection with an active controller link is lost (poll failure), the Wireless AP automatically scans (pings) all addresses in its availability interface list. The Wireless AP then connects to the highest priority interface that responds to its probe.

Events and Actions in Availability

If one of the SCALANCE IWLAN Controllers in a pair fails, the communication between the two SCALANCE IWLAN Controllers stops. This triggers a failover condition and a critical message is displayed in the information log of the secondary SCALANCE IWLAN Controller.


SIEMENS
SCALANCE W Logs & Traces
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
WLC: Events | Restore/Import | S/W Upgrade •AP: Logs | Traces •Mitigator: Logs •Audit: UI •Services: DHCP | NTP | Login
Severity: Critical | Major | Minor | Info | All
Timestamp
Type
Component
Log Message
10/21/11 17:17:50 Critical Config Manager Config Manager has suffered a critical error and will halt. Error Details: Failed to connect to database 'controllerConfig': Can't connect to local MySQL server through socket '/var/lib/mysql/mysql.sock' (2)
10/21/11 17:17:47 Critical Config Manager Config Manager has suffered a critical error and will halt. Error Details: Failed to connect to database 'controllerConfig': Can't connect to local MySQL server through socket '/var/lib/mysql/mysql.sock' (2)
10/21/11 17:12:16 Critical Config Manager Config Manager has suffered a critical error and will halt. Error Details: Failed to connect to database 'controllerConfig': Can't connect to local MySQL server through socket '/var/lib/mysql/mysql.sock' (2)
10/21/11 17:12:13 Critical Config Manager Config Manager has suffered a critical error and will halt. Error Details: Failed to connect to database 'controllerConfig': Can't connect to local MySQL server through socket '/var/lib/mysql/mysql.sock' (2)
10/21/11 16:00:11 Critical Config Manager Config Manager has suffered a critical error and will halt. Error Details: Failed to connect to database 'controllerConfig': Can't connect to local MySQL server through socket '/var/lib/mysql/mysql.sock' (2)
10/21/11 16:00:08 Critical Config Manager Config Manager has suffered a critical error and will halt. Error Details: Failed to connect to database 'controllerConfig': Can't connect to local MySQL server through socket '/var/lib/mysql/mysql.sock' (2)
10/19/11 16:35:57 Critical Config Manager Config Manager has suffered a critical error and will halt. Error Details: Failed to connect to database 'controllerConfig': Can't connect to local MySQL server through socket '/var/lib/mysql/mysql.sock' (2)
10/19/11 16:35:54 Critical Config Manager Config Manager has suffered a critical error and will halt. Error Details: Failed to connect to database 'controllerConfig': Can't connect to local MySQL server through socket '/var/lib/mysql/mysql.sock' (2)
10/19/11 16:35:51 Critical Config Manager Config Manager has suffered a critical error and will halt. Error Details: Failed to connect to database 'controllerConfig': Can't connect to local MySQL server through socket '/var/lib/mysql/mysql.sock' (2)
10/19/11 Critical Config Config Manager has suffered a critical error and will halt. Error Details:
41 critical log messages found
Total pages: 1
Go
Tech Support
Export
Refresh

After a Wireless AP on the failed SCALANCE IWLAN Controller loses its connection, it will try to connect to all enabled interfaces on both controllers without rebooting. If the Wireless AP is not successful, it will begin the discovery process. If the Wireless AP is not successful in connecting to the SCALANCE IWLAN Controller after five minutes of attempting, the Wireless AP will reboot if there is no **Bridge traffic locally at the AP** topology associated to it.

All mobile user's sessions using the failover Wireless AP will terminate except those associated to a **Bridge traffic locally at the AP** and if the **Maintain client sessions in event of poll failure** option is enabled on the **AP Properties** tab or **AP Default Settings** screen.

When the Wireless APs connect to the second SCALANCE IWLAN Controller, they are either assigned to the VNS that is defined in the system's default AP configuration or manually configured by the administrator. The mobile users log on again and are authenticated on the second SCALANCE IWLAN Controller.

When the failed SCALANCE IWLAN Controller recovers, each SCALANCE IWLAN Controller in the pair goes back to normal mode. They exchange information including the latest lists of registered Wireless APs. The administrator must release the Wireless APs manually on the second

SCALANCE IWLAN Controller, so that they may re-register with their home SCALANCE IWLAN Controller. Foreign APs can now all be released at once by using the **Foreign** button on the **Access Approval** screen to select all foreign APs, and then clicking **Release**.

To support the availability feature during a failover event, you need to do the following:

1. Monitor the critical messages for the failover mode message, in the information log of the remaining SCALANCE IWLAN Controller (in the **Logs & Traces** section of the SCALANCE W Wireless Assistant).
2. After recovery, on the SCALANCE IWLAN Controller that did not fail, select the foreign Wireless APs, and then click **Release** on the **Access Approval** screen.

Availability Prerequisites

Before you configure availability, you must do the following:

- Choose the primary and secondary SCALANCE IWLAN Controllers.
- Verify the network accessibility for the UDP connection between the two controllers. The availability link is established as a UDP session on port 13911.
- Set up a DHCP server for AP subnets to support Option 78 for SLP, so that it points to the IP addresses of the physical interfaces on both the SCALANCE IWLAN Controllers.
- Ensure that the **Poll Timeout** value on the **AP Properties** tab **Advanced** dialog is set to 1.5 to 2 times of **Detect link failure** value on the SCALANCE IWLAN Controller **> Availability** screen. For more information, see "Configuring a Wireless AP's Properties" on page 3-21.

  If the **Poll Timeout** value is less than 1.5 to 2 times of **Detect link failure value**, the Wireless AP failover will not succeed because the secondary controller will not be 'ready' to accept the failover APs.

  On the other hand, if the **Poll Timeout** value is more than 1.5 to 2 times of **Detect link failure value**, the Wireless APs failover will be unnecessarily delayed, because the Wireless APs will continue polling the primary controller even though the secondary controller is ready to accept them as the failover APs.
- To achieve ideal availability behavior, you must set the **Poll Timeout** value for all Wireless APs to 15 seconds, and the **Detect link failure** on the SCALANCE IWLAN Controller **> Availability** screen to ten seconds.

Configuring Availability Using the Availability Wizard

The availability wizard allows you to create an availability pair from one of the SCALANCE IWLAN Controllers that will be in the availability pair. When creating the availability pair, you also have the option to synchronize VNS definitions and GuestPortal user accounts between the paired SCALANCE IWLAN Controllers.

To Configure Availability Using the Availability Wizard:

1. From the top menu, click **Wireless Controller**. The SCALANCE IWLAN Controller **Configuration** screen is displayed.
2. In the left pane, click **Availability**. The availability configuration screen is displayed.

3. In the **Availability Wizard** section, click **Start**. The **Availability Pair Wizard** screen is displayed.

SIEMENS
SCALANCE W Wireless Controller Configuration
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
Availability Pair Wizard
This wizard enables you to quickly configure an Availability Pair from one controller.
This controller will become the primary connection point.
Connection Details
Select Port: Admin (192.168.3.45)
Peer Controller IP: 0.0.0.0
Peer Controller Login:
User:
Password:
Fast Failover:
Synchronization Options
* Please note that this will replace ALL of the selected definitions on the target controller
Synchronize System Configuration
Synchronize Guest Portal Accounts
Back
Next
Cancel

4. In the **Connection Details** section, do the following:
   - **Select Port** — Select the port and IP address of the primary controller that is to be used to establish the availability link.
   - **Peer Controller IP** — Type the IP address of the peer (secondary) controller.
   - **User** — Type the login user name credentials of an account that has full administrative privileges on the peer controller.
   - **Password** — Type the login password used with the user ID to login to the peer controller.
   - **Enable Fast Failover** — Select this checkbox to enable Fast Failover for the availability pair.
5. In the **Synchronize Options** section, do the following:
   - **Synchronize System Configuration** — Select this checkbox to push the configured **Routed** and **Bridge Traffic Locally at Controller** VNS definitions from the primary controller to the peer controller. **WDS** and **3rd Party AP** VNS definitions are ignored and not synchronized.

Note:
Synchronizing the VNS definitions will delete and replace existing VNS definitions on the peer controller.

   - **Synchronize Guest Portal Accounts** — Select this checkbox to push GuestPortal user accounts to the peer controller.
6. Click **Next**.

7. If you are synchronizing topology definitions, the **Topology Definitions** screen is displayed. Do the following:

   a. In the **Synchronization Settings** section, complete the topology properties that are missing. Any topology that did not already exist on the peer controller will have missing properties on the Topology Definitions screen.

      The fields configured are actual parameter values that are configured at the remote Controller with respect to associated topologies chosen for synchronization. Some of these parameters are: Interface IP address, Netmask, L2 port, VLAN ID, DHCP range, etc.

   b. Click **Finish**.

8. If you are not synchronizing topology definitions, the availability wizard completes the configuration.

9. Click **Close**.

This operation marks the desired topologies for synchronization. The two controllers exchange information and the configuration is applied to the remote controller.

On the local controller, the "Enable Synchronization of System Configuration" becomes selected. This can be double checked by navigating to VNS Configuration, Global and then Sync Summary. This tab also lists all topologies, policies, WLAN Services and VNSes with their synchronization status (on or off).

The Sync status for any of these elements can also be changed from this tab.

All these configurable elements have a **Synchronize** check box (on their main/general configuration tab) that allows for individual control and selection of availability from the main element configuration page.

Configuring Availability Manually

When configuring availability manually, you configure each SCALANCE IWLAN Controller separately.

1. On the SCALANCE IWLAN Controller Configuration **Availability** screen, set up the SCALANCE IWLAN Controller in **Paired** Mode.

2. On the **VNS** configuration window, define a VNS (through topology, WLAN service, policy and VNS configuration) on each SCALANCE IWLAN Controller with the same SSID. The IP addresses must be unique. For more information, see "Manually Creating a VNS" on page 7-21. A SCALANCE IWLAN Controller VLAN Bridged topology can permit two controllers to share the same subnet. This setup provides support for mobility users in a VLAN Bridged VNS.

3. On both SCALANCE IWLAN Controllers, on the Wireless AP Registration screen, select the Security Mode **Allow only approved** Wireless AP**s to connect** option so that no more Wireless APs can register unless they are approved by the administrator.

4. On each SCALANCE IWLAN Controller, on the Wireless AP configuration **Access Approval** screen, check the status of the Wireless APs and approve any APs that should be connected to that controller.

   System AP defaults can be used to assign a group of VNSs to the foreign APs:

   – If the APs are not yet known to the system, the AP will be initially configured according to AP default settings. To ensure better transition in availability, Siemens recommends that the AP default settings match the desired assignment for failover APs.

- AP assignment to WLAN Services according to the AP default settings can be overwritten by manually modifying the AP assignment. (For example, select and assign each WLAN service that the AP should connect to.)
- If specific foreign APs have been assigned to a WLAN service, those specific foreign AP assignments are used.

An alternate method to setting up APs includes:

1. Add each Wireless AP manually to each SCALANCE IWLAN Controller.
2. On the **AP Properties** screen, click **Add** Wireless AP.
3. Define the Wireless AP, and then click **Add** Wireless AP.

   Manually defined APs will inherit the default AP configuration settings.

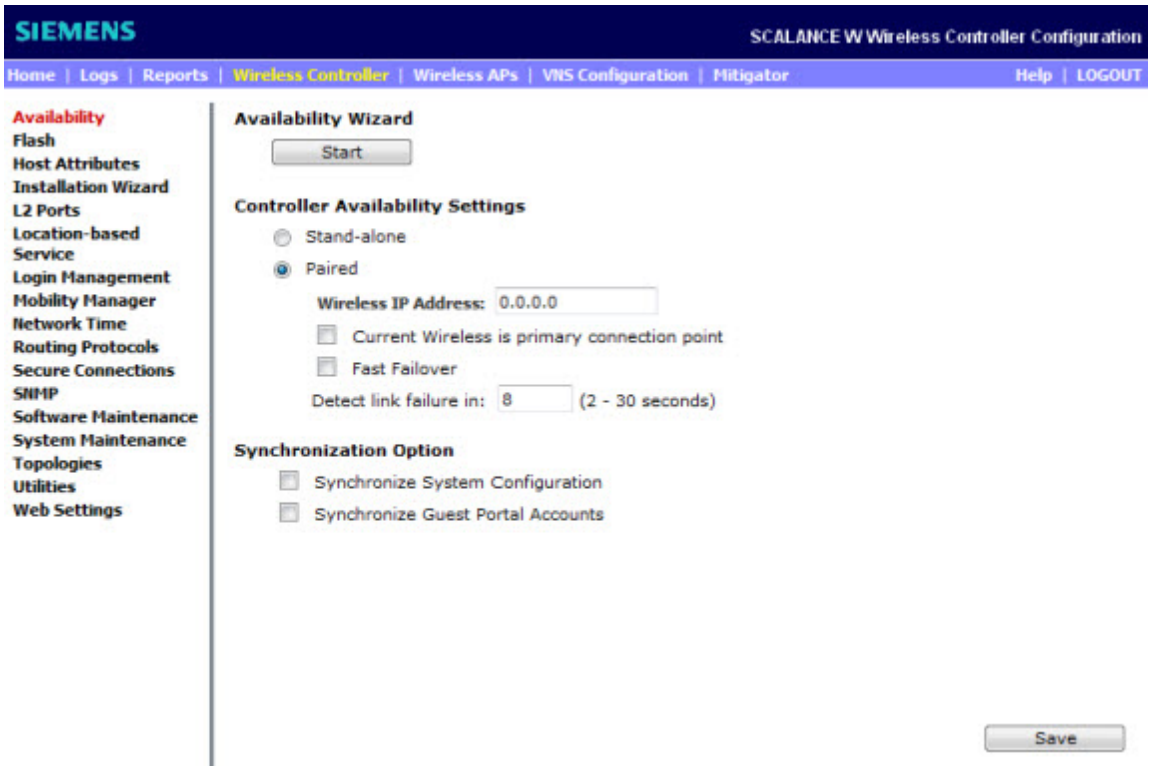
NOTICE

If two SCALANCE IWLAN Controllers are paired and one has the **Allow All** option set for Wireless AP registration, all Wireless APs will register with that SCALANCE IWLAN Controller.

Setting the Primary or Secondary SCALANCE IWLAN Controllers for Availability

To Set the Primary or Secondary SCALANCE IWLAN Controllers for Availability:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **Availability**.



3. To enable availability, select the **Paired** option.

4. Do one of the following:
   - For a primary controller, in the **Wireless IP Address** box, type the **IP address** of the data interface of the secondary SCALANCE IWLAN Controller. This IP address must be on a routable subnet between the two SCALANCE IWLAN Controllers.
   - For a secondary controller, in the **Wireless IP Address** box, type the IP address of the Management port or data interface of the primary SCALANCE IWLAN Controller.
5. Set this SCALANCE IWLAN Controller as the primary or secondary connection point:
   - To set this SCALANCE IWLAN Controller as the **primary connection point**, select the **Current Wireless is primary connect point** checkbox.
   - To set this SCALANCE IWLAN Controller as the **secondary connection point**, clear the **Current Wireless is primary connect point** checkbox.

   If the **Current Wireless is primary connect point** checkbox is selected, the specified controller sends a connection request. If the **Current Wireless is primary connect point** checkbox is cleared, the specified controller waits for a connection request. Confirm that one controller has this checkbox selected, and the second controller has this checkbox cleared, since improper configuration of this option will result in incorrect network configuration.
6. On both the primary and secondary controllers, type the **Detect link failure value**.

Note:
Ensure that the **Detect link failure** value on both the controllers is identical.

7. On both the primary and secondary controllers, select the **Synchronize GuestPortal Guest Users** option to synchronize GuestPortal guest accounts between the controllers.
8. From the top menu, click **Wireless APs**. The SCALANCE IWLAN **AP Configuration** screen is displayed.
9. In the left pane, click **AP Registration**. To set the **security mode** for the SCALANCE IWLAN Controller, select one of the following options:
   - **Allow all Wireless APs to connect** — If the SCALANCE IWLAN Controller does not recognize the serial number, it sends a default configuration to the Wireless AP. Or, if the SCALANCE IWLAN Controller recognizes the serial number, it sends the specific configuration (port and binding key) set for that Wireless AP.
   - **Allow only approved Wireless APs to connect** — If the SCALANCE IWLAN Controller does not recognize the serial number, the Wireless APs will be in pending mode and the administrator must manually approve them. Or, if the SCALANCE IWLAN Controller recognizes the serial number, it sends the configuration for that Wireless AP.

Note:
During the initial setup of the network, Siemens recommends that you select the **Allow all** Wireless AP**s to connect** option. This option is the most efficient way to get a large number of Wireless APs registered with the SCALANCE IWLAN Controller.

Once the initial setup is complete, Siemens recommends that you reset the security mode to the **Allow only approved** Wireless AP**s to connect** option. This option ensures that no unapproved Wireless APs are allowed to connect. For more information, see “Configuring Wireless AP Settings” on page 3-19.

10. To save your changes, click **Save**.

Note:
When two SCALANCE IWLAN Controllers have been paired as described above, each SCALANCE IWLAN

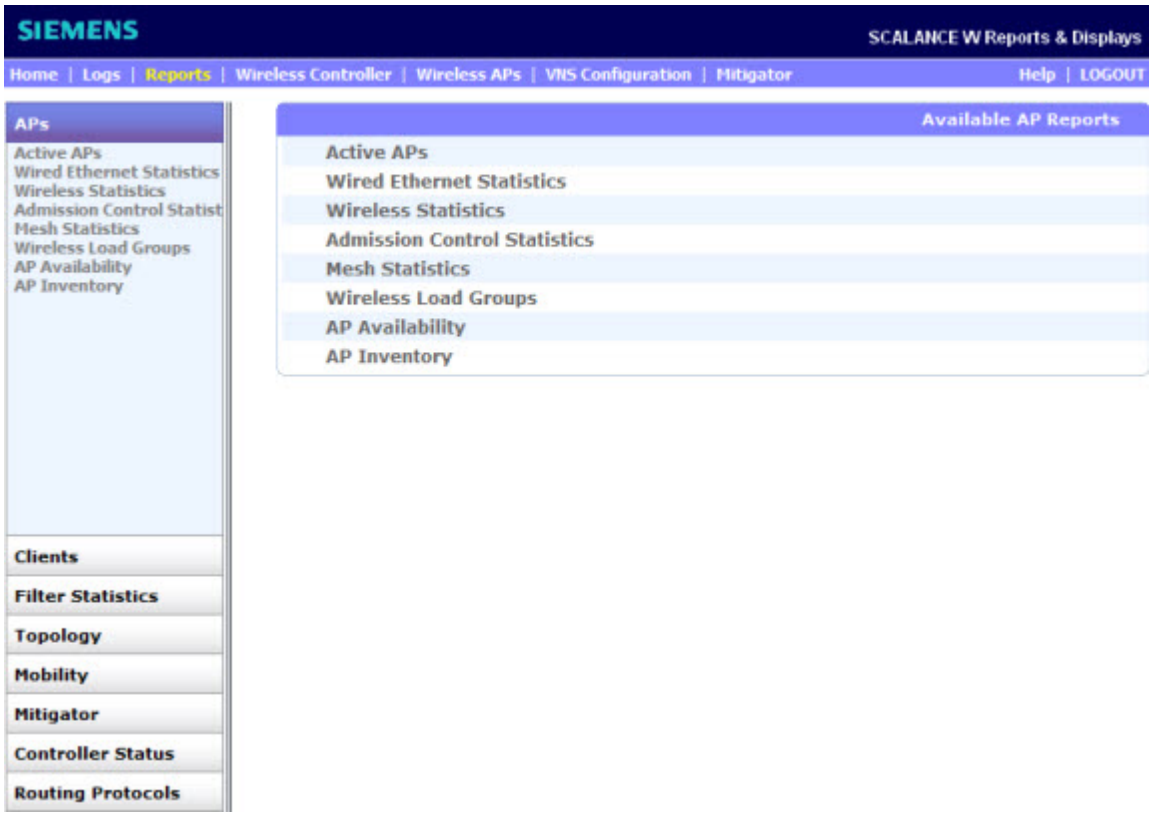
Controller's registered Wireless APs will appear as foreign on the other controller in the list of available Wireless APs when configuring a VNS topology.

11. Verify that availability is configured correctly.

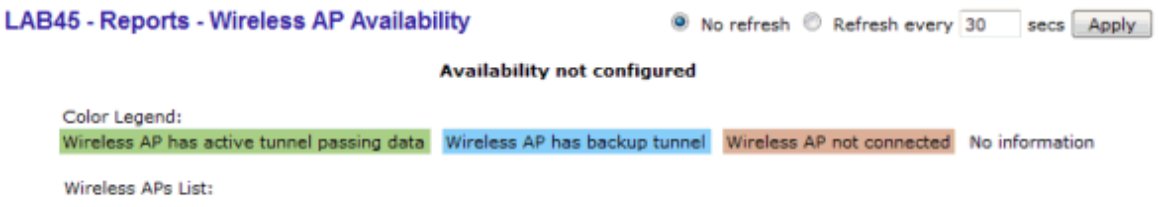
Verifying Availability

To verify that availability is configured correctly:

a. From the top menu of either of the two controllers, click **Reports**. The **Available AP Reports** screen is displayed.



b. From the **Reports and Displays** menu, click **AP Availability**. The **Wireless Availability Report** is displayed.



c. Check the statement at the top of the screen.

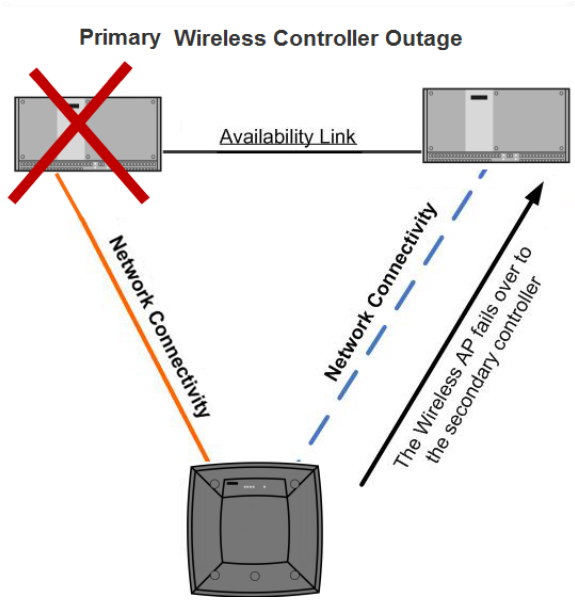
If the statement reads **Availability link is up**, the availability feature is configured correctly. If the statement reads **Availability link is down**, check the configuration error logs. For more information on logs, see the SCALANCE WLC711 *Maintenance Guide*.

Session Availability

Session availability enables Wireless APs to switch over to a standby (secondary) SCALANCE IWLAN Controller fast enough to maintain the mobile user's session availability in the following scenarios:

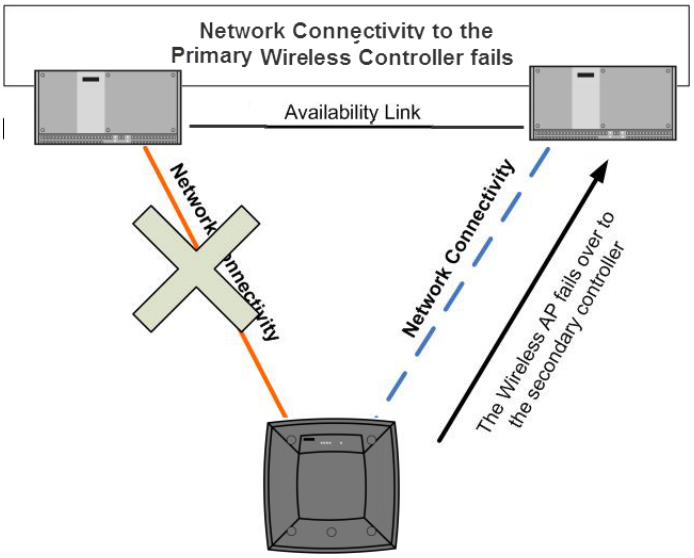
- The primary SCALANCE IWLAN Controller goes down (Figure 12-1).

Figure 12-1 AP Fail Over to 2ndary Controller When Primary Goes Down



- The Wireless AP's network connectivity to the primary SCALANCE IWLAN Controller fails (Figure 12-2).

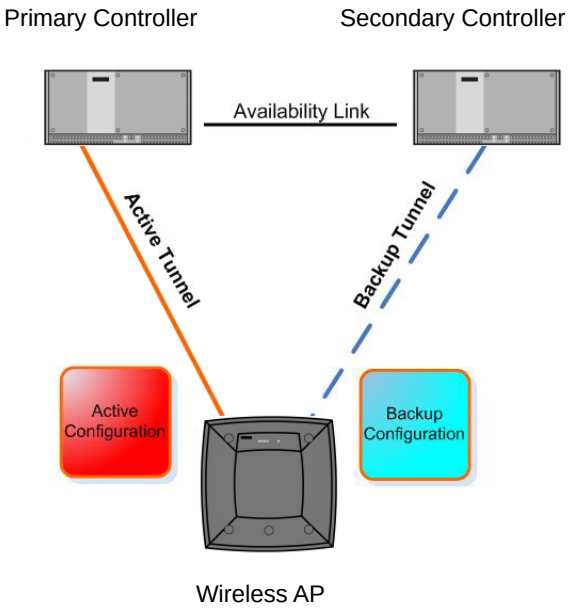
Figure 12-2 AP Fail Over to 2ndary Controller When Connectivity to Primary Fails



The secondary SCALANCE IWLAN Controller does not have to detect its link failure with the primary SCALANCE IWLAN Controller for the session availability to kick in. If the Wireless AP loses five consecutive polls to the primary controller either due to the controller outage or connectivity failure, it fails over to the secondary controller fast enough to maintain the user session.

In session availability mode (Figure 12-3), the Wireless APs connect to both the primary and secondary SCALANCE IWLAN Controllers. While the connectivity to the primary SCALANCE IWLAN Controller is via the “active” tunnel, the connectivity to the secondary SCALANCE IWLAN Controller is via the “backup” tunnel.

Figure 12-3 Session Availability Mode



The following is the traffic flow of the topology illustrated in Figure 12-3:

- The Wireless AP establishes the active tunnel to connect to the primary SCALANCE IWLAN Controller.
- The SCALANCE IWLAN Controller sends the configuration to the Wireless AP. This configuration also contains the port information of the secondary SCALANCE IWLAN Controller.
- On the basis of the secondary SCALANCE IWLAN Controller's port information, the Wireless AP connects to the secondary controller via the backup tunnel.
- After the connection is established via the backup tunnel, the secondary SCALANCE IWLAN Controller sends the backup configuration to the Wireless AP.
- The Wireless AP receives the backup configuration and stores it in its memory to use it for failing over to the secondary controller. All this while, the Wireless AP is connected to the primary SCALANCE IWLAN Controller via the 'active' tunnel.

Session availability applies only to the following topologies:

- Bridge Traffic Locally at Controller
- Bridge Traffic Locally at AP

Note:
Session availability is not supported in a VNS that is configured for AAA network assignment

Events and Actions in Session Availability

In the event of a primary SCALANCE IWLAN Controller outage, or the network connectivity failure to the primary controller, the Wireless AP:

- Sends a 'tunnel-active-req' request message to the secondary SCALANCE IWLAN Controller.
- The secondary SCALANCE IWLAN Controller accepts the request by sending the 'tunnel-activate-response' message.
- The Wireless APapplies the backup configuration and starts sending the data. The client devices' authentication state is not preserved during failover.

When the fast failover takes place, a critical message is displayed in the information log of the secondary SCALANCE IWLAN Controller.

Note:
In session availability, the maximum number of failover APs that the secondary controller can accommodate is equal to the maximum number of APs supported by the hardware platform.

When the failed SCALANCE IWLAN Controller recovers, each SCALANCE IWLAN Controller in the pair goes back to normal mode. They exchange information that includes the latest lists of registered Wireless APs. The administrator must release the Wireless APs manually on the second SCALANCE IWLAN Controller, so that they may re-register with their home SCALANCE IWLAN Controller. Foreign APs can now all be released at once by using the **Foreign** button on the **Access Approval** screen to select all foreign APs, and then clicking **Released**.

To support the availability feature during a failover event, administrators need to do the following:

1. Monitor the critical messages for the failover mode message, in the information log of the secondary SCALANCE IWLAN Controller (in the **Logs & Traces** section of the SCALANCE

W Wireless Assistant).

2. After recovery, on the secondary SCALANCE IWLAN Controller, select the foreign Wireless APs, and then click **Release** on the **Access Approval** screen.

After the Wireless APs are released, they establish the active tunnel to their home controller and backup tunnel to the secondary controller.

Enabling Session Availability

Session availability is supported when fast failover is enabled and when "Synchronize System Configuration" is selected. For more information, see "Configuring Fast Failover and Enabling Session Availability" on page 12-12.

In session availability, mobile user devices are able to retain their IP address. In addition, the mobile user device does not have to have to re-associate after the failover. These characteristics ensure that the failover is achieved within 5 seconds, which is fast enough to maintain the mobile user's session.

Note:
In session availability, the fast failover is achieved within 5 seconds only if there is at least one client device (mobile unit) associated to the Wireless AP. In the absence of any client device, the Wireless AP takes more time to failover since there is no need to preserve the user session.

The authentication state is not preserved during fast failover. If a WLAN Service requires authentication, the client device must re-authenticate. However, in such a case, the session availability is not guaranteed because authentication may require additional time during which the user session may be disrupted.

Session availability is not supported in a WLAN Service that uses Captive Portal (CP) authentication.

Session availability does not support user-specific filters as these filters are not shared between the primary and secondary SCALANCE IWLAN Controllers.

Configuring Fast Failover and Enabling Session Availability

Before you configure the fast failover feature, ensure the following:

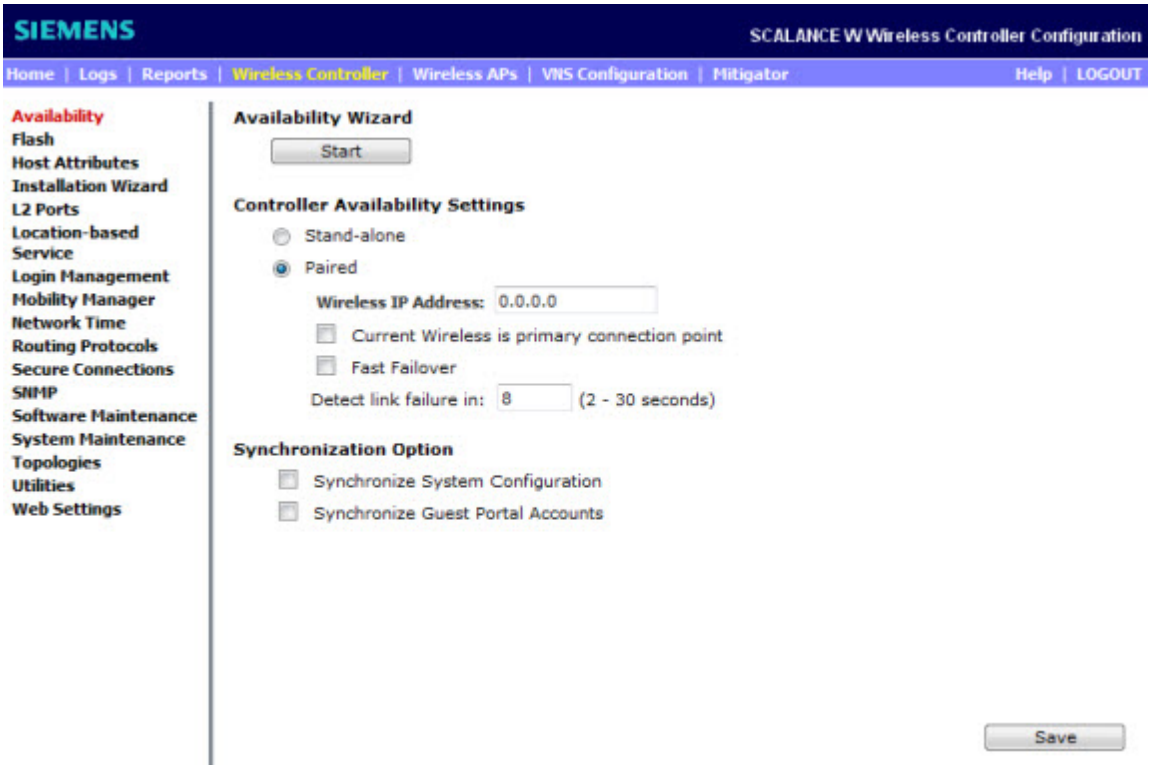
- The primary and secondary SCALANCE IWLAN Controllers are properly configured in availability mode. For more information, see "Availability" on page 12-1.
- Both the primary and secondary SCALANCE WLC711 Controllers are running the most recent SCALANCE WLC711 Convergence Software releases.
- A network connection exists between the two SCALANCE IWLAN Controllers.
- The Wireless APs are operating in availability mode.
- The deployment is designed in such a way that the service provided by the Wireless APs is not dependent on which SCALANCE IWLAN Controller the APs associate with. For example, the fast failover feature will not support the deployment in which the two SCALANCE IWLAN Controllers in availability mode are connected via a WAN link.
- Both the primary and secondary SCALANCE IWLAN Controllers have equivalent upstream access to the servers on which they depend. For example, both the controllers must have access to the same RADIUS and DHCP servers.
- The users (client devices) that use DHCP must obtain their addresses from a DHCP Server that is external to the SCALANCE IWLAN Controller.

- Time on all the network elements (both the SCALANCE IWLAN Controllers in availability pair, Wireless APs, DHCP and RADIUS servers etc.) is synchronized. For more information, see "Configuring Network Time" on page 2-49.

Note:
The fast failover feature works optimally in fast networks (preferably switched networks).

To Configure Fast Failover and Enable Session Availability:

1. Log on to both the primary and secondary SCALANCE IWLAN Controllers.
2. From the top menu of the primary SCALANCE IWLAN Controller, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
3. In the left pane, click **Availability**.



4. Under **Controller Availability Settings**, select **Paired**.
5. Select the **Fast Failover** checkbox.
6. Type the appropriate value in the **Detect link failure** box.

   The **Detect link failure** field specifies the period within which the system detects link failure after the link has failed. For fast failover configuration, this parameter is tied closely to the **Poll Timeout** parameter on the **AP Properties** tab **Advanced** dialog. The **Poll Timeout** field specifies the period for which the Wireless AP waits before re-attempting to establish a link when its polling to the primary SCALANCE IWLAN Controller fails.

   For the fast failover feature to work within 5 seconds, the **Poll Timeout** value should be 1.5 to 2 times the **Detect link failure** value. For example, if you have set the **Detect link failure** value to 2 seconds, the **Poll Timeout** value should be set to 3 or 4 seconds.

7. In the **Synchronization Option** area, select **Synchronize System Configuration**.

   This is a global parameter that enables synchronization of VNS configuration components (topology, policy, WLAN Service, VNS) on both controllers paired for availability and/or fast failover.

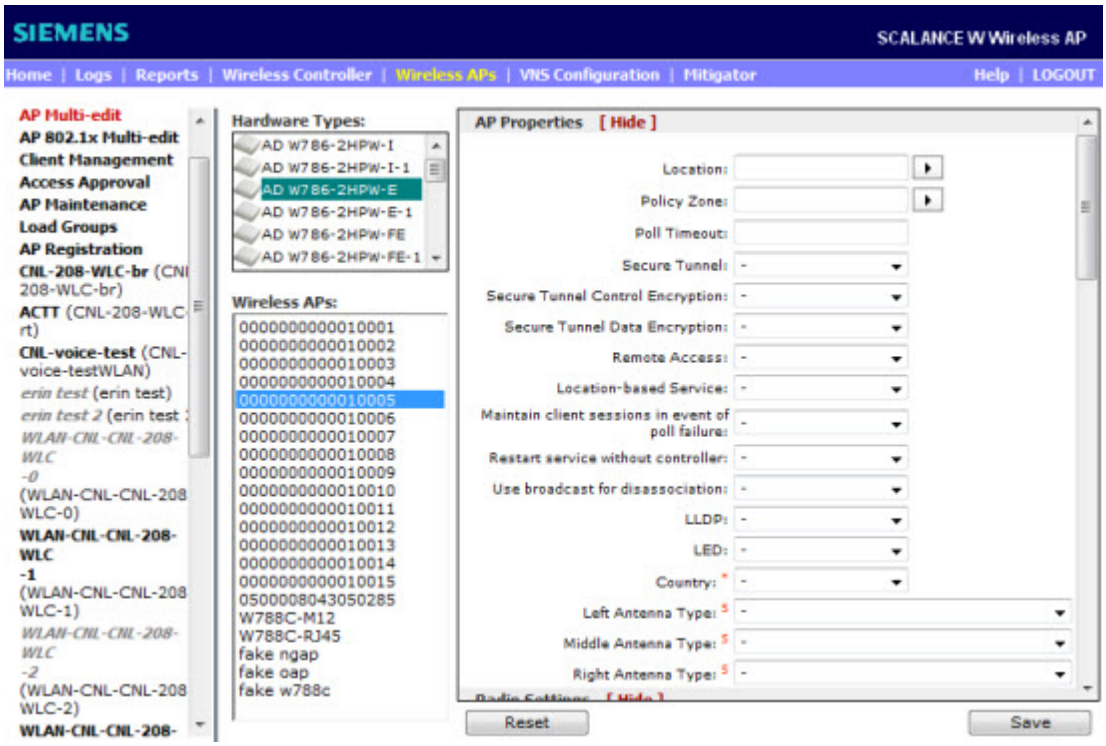
   For more information about synchronization, see "Using the Sync Summary" on page 7-19.

8. Click **Save**.

9. Set the Wireless APs' **Poll Timeout** value for fast failover.

   a. From the top menu of the primary SCALANCE IWLAN Controller, click **Wireless APs**. The **Wireless APs Properties** screen is displayed.

   b. In the left pane, click **AP Multi-edit**. The **AP Multi-edit** screen is displayed.



   c. In the **Hardware Types** list, select the hardware type of the Wireless APs that are part of your deployment. You can select multiple hardware types by pressing the **CTRL** key and clicking the hardware in the **Hardware Types** list.

   d. In the **Wireless APs** list, select the Wireless APs for which you want to set the **Poll Timeout** value. You can select multiple Wireless APs by pressing the **CTRL** key and clicking the Wireless APs in the **Wireless APs** list.

   e. In the **Poll Timeout** box, type/edit the appropriate value.

   f. To save your changes, click **Save**.

Note:
The fast failover configuration must be identical on both the primary and secondary SCALANCE IWLAN Controllers. Logs are generated if the configuration is not identical. For more information, see the SCALANCE WLC711 *Maintenance Guide*.

After you have configured fast failover, you can verify session availability to preserve the user session during the failover.

Verifying Session Availability

To have session availability, you must ensure the following:

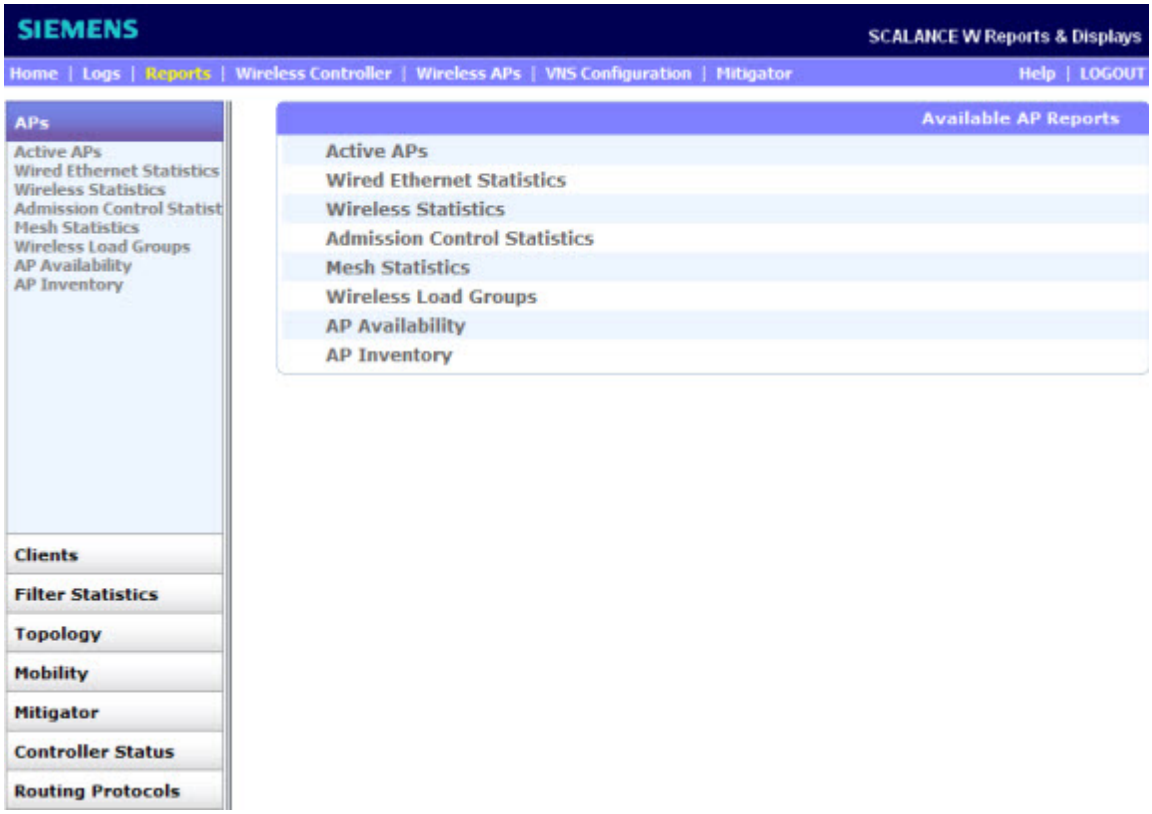
- The primary and secondary SCALANCE IWLAN Controllers are properly configured in 'availability' mode. For more information, see "Availability" on page 12-1.
- The fast failover feature is properly configured. For more information, see "Configuring Fast Failover and Enabling Session Availability" on page 12-12.

Note:
If you haven't configured the fast failover feature, the **Enable Session Availability** checkbox is not displayed.

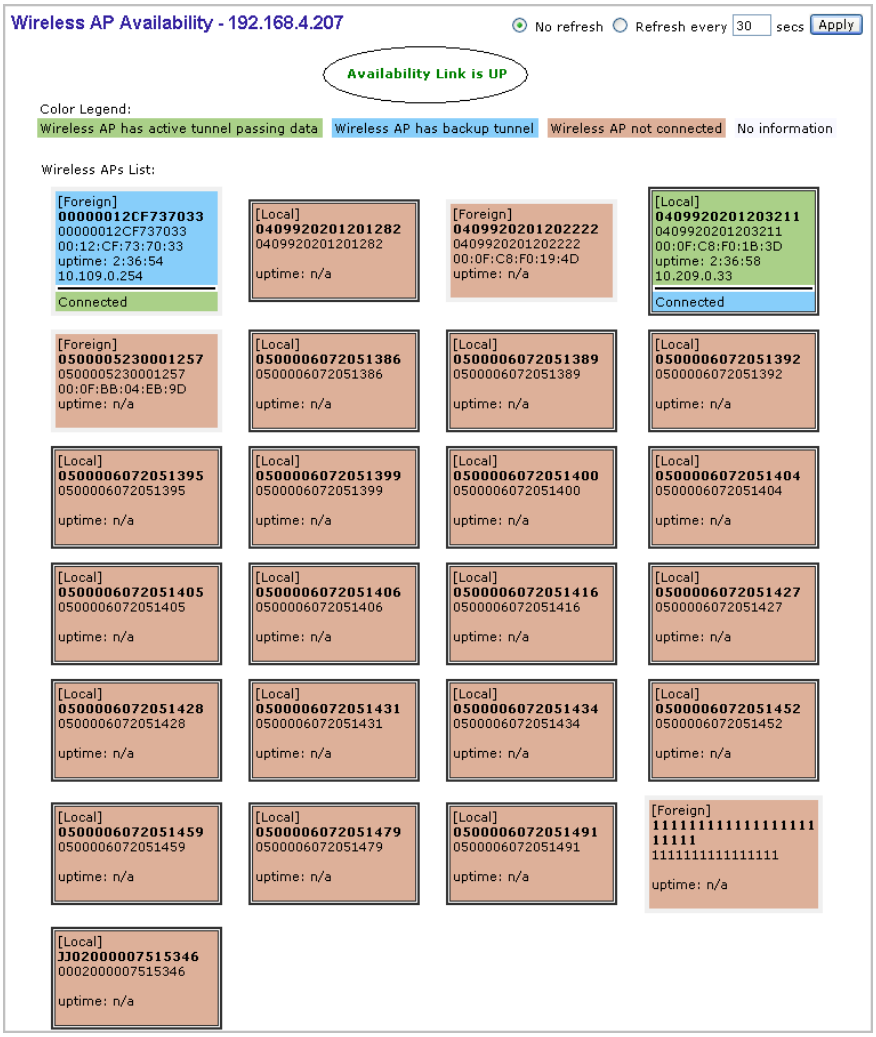
- Time on all the network elements — both the SCALANCE IWLAN Controllers in availability pair, Wireless APs, DHCP and RADIUS servers etc.— is synchronized. For more information, see "Configuring Network Time" on page 2-49.
- Both the SCALANCE IWLAN Controllers in fast failover mode must be running the most recent SCALANCE IWLAN Convergence Software release.
- If you are using **Bridge Traffic Locally at Controller** topology, you must select **None** from the **DHCP Option** drop-down menu.
- The **Bridge Traffic Locally at Controller** must be mapped to the same VLAN on both the primary and secondary SCALANCE IWLAN Controllers.

To Verify the Session Availability Feature Is Configured Correctly:

1. From the top menu of either of the two controllers, click **Reports**. The **Available AP Reports** screen is displayed.



2. From the **Reports and Displays** menu, click **Wireless AP Availability**. The **Wireless Availability Report** is displayed.



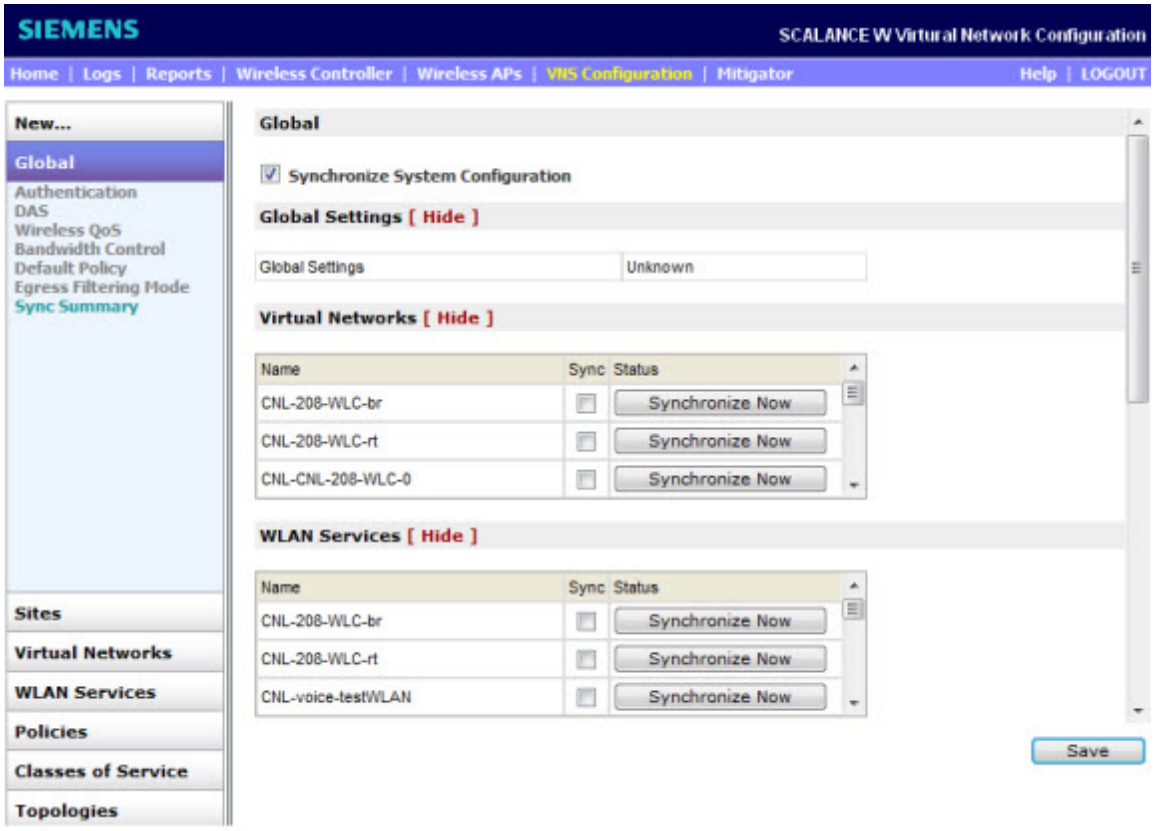
3. Check the statement at the top of the screen.

   If the statement reads **Availability link is up**, the availability feature is configured correctly. If the statement reads **Availability link is down**, check the configuration error in logs. For more information on logs, see the SCALANCE WLC711 *Maintenance Guide*.

Verify Synchronization

To verify that all elements have been synchronized correctly, navigate to the VNS tab on both the primary and secondary SCALANCE IWLAN Controllers, and confirm that the topologies, WLAN services, policies and desired VNSs are displayed as **[synchronized]**.

You can verify this by selecting the appropriate tabs and then inspecting the Synchronized flags or by navigating to VNS Configuration > Global > Sync Summary.



Configuration synchronization:

- VNS configuration related synchronization will be supported with legacy or fast failover availability configuration as long as there is an availability link established.
- Synchronization for VNS, WLAN Services, Policies, Topologies, and Rate Limit Profiles can be enabled/disabled individually.
- VNS, WLAN Service, Policy, Topology, and Rate Limit Profile configuration will be dynamically synchronized when synchronization is enabled individually between a pair of SCALANCE IWLAN Controllers.

MU session synchronization:

- MU session synchronization will be supported only when there is fast failover configured between two SCALANCE IWLAN Controllers.
- If mobility is disabled, MU session with Bridge Traffic Locally at AP, Bridge Traffic Locally at Controller, and Routed topologies will all be synchronized between a pair of SCALANCE IWLAN Controllers.
- If mobility is enabled, an MU session with Routed topologies will not be synchronized.

Viewing SLP Activity

In normal operations, the primary SCALANCE IWLAN Controller registers as an SLP service called ac_manager. The controller service directs the Wireless APs to the appropriate SCALANCE IWLAN Controller. During an outage, if the remaining SCALANCE IWLAN Controller is the secondary controller, it registers as the SLP service ru_manager.

To View SLP Activity:

1. From the top menu, click **Wireless APs**. The Wireless AP**s** screen is displayed.
2. In the left pane, click **AP Registration**. The **Wireless AP Registration** screen is displayed.
3. To confirm SLP registration, click **View SLP Registration**. A pop-up screen displays the results of the diagnostic slpdump tool, to confirm SLP registration.

SIEMENS
SLP Registration
Please wait while running slpdump...
dhcpSendAndRecv2: got 1 SLP Agents:
127.0.0.1
ProcessSrvRplyCallback: The header functionid 2
dhcpSendAndRecv2: got 1 SLP Agents:
127.0.0.1
url: siemens://192.168.4.1 lifetime: 210 attributes: (attr1=ac_manager)
1 entries found for service "siemens".
ProcessSrvRplyCallback: The header functionid 2
dhcpSendAndRecv2: got 1 SLP Agents:
127.0.0.1
url: chantry://192.168.4.1 lifetime: 210 attributes: (attr1=ac_manager)
1 entries found for service "chantry".
ProcessSrvRplyCallback: The header functionid 2
0 entries found for service "siemensNet".
ProcessSrvRplyCallback: The header functionid 2
0 entries found for service "chantryNet".
SLPD connection closed
Finished.

13

Configuring Mobility

This chapter describes the mobility concept, including:

For information about...	Refer to page...
Mobility Overview	13-1
Mobility Domain Topologies	13-3
Configuring a Mobility Domain	13-4

Mobility Overview

The SCALANCE WLC711 system allows up to 12 SCALANCE IWLAN Controllers on a network to discover each other and exchange information about a client session. This technique enables a wireless device user to roam seamlessly between different Wireless APs on different SCALANCE IWLAN Controllers.

The solution introduces the concept of a mobility manager; one SCALANCE IWLAN Controller on the network is designated as the **mobility manager** and all others are designated as **mobility agents**.

The wireless device keeps the IP address, and the service assignments it received from its home SCALANCE IWLAN Controller—the SCALANCE IWLAN Controller that it first connected to. The WLAN Service on each SCALANCE IWLAN Controller must have the same SSID and RF privacy parameter settings.

You have two options for choosing the mobility manager:

- Rely on SLP with DHCP Option 78
- Define at the agent the IP address of the mobility manager. By explicitly defining the IP address, the agent and the mobility manager are able to find each other directly without using the SLP discovery mechanisms. Direct IP definition is recommended to provide tighter control of the registration steps for multi-domain installations.

The SCALANCE IWLAN Controller designated as the mobility manager:

- Is explicitly identified as the manager for a specific mobility domain. Agents will connect to this manager to establish a mobility domain.
- Defines at the agent the IP address of the mobility manager, which allows for the bypass of SLP. Agents directly find and attempt to register with the mobility manager.
- Uses SLP, if this method is preferred, to register itself with the SLP Directory Agent as SiemensNet.

- Defines the registration behavior for a multi-controller mobility domain set:
  - **Open mode** — A new agent is automatically able to register itself with the mobility manager and immediately becomes part of the mobility domain
  - **Secure mode** — The mobility manager does not allow a new agent to automatically register. Instead, the connection with the new agent is placed in pending state until the administrator approves the new device.
- Listens for connection attempts from mobility agents.
- Establishes connections and sends a message to the mobility agent specifying the heartbeat interval, and the mobility manager's IP address if it receives a connection attempt from the agent.
- Sends regular heartbeat messages containing wireless device session changes and agent changes to the mobility agents and waits for a returned update message

The SCALANCE IWLAN Controller designated as a mobility agent does the following:

- Uses SLP or a statically configured IP address to locate the mobility manager
- Defines at the agent the IP address of the mobility manager, which allows for the bypass of SLP. Agents directly find and attempt to register with the mobility manager.
- Attempts to establish a TCP/IP connection with the mobility manager
- Sends updates, in response to the heartbeat message, on the wireless device users and the data tunnels to the mobility manager.

If a controller configured as the mobility manager is lost, the following occurs:

- Agent to agent connections remain active.
- Mobility agents continue to operate based on the mobility information last coordinated before the manager link was lost. The mobility location list remains relatively unaffected by the controller failure. Only entries associated with the failed controller are cleared from the registration list, and users that have roamed from the manager controller to other agents are terminated and required to re-register as local users with the agent where they are currently located.
- The data link between active controllers remains active after the loss of a mobility manager
- Mobility agents continue to use the last set of mobility location lists to service known users
- Existing users remain in the mobility scenario, and if the users are known to the mobility domain, they continue to be able to roam between connected controllers
- New users become local at attaching controller
- Roaming to another controller resets session

The mobility network that includes all the SCALANCE IWLAN Controllers and the Wireless APs is called the **Mobility Domain**.

Note:
The mobility feature is not backward compatible. This means that all the SCALANCE IWLAN Controllers in the mobility domain must be running the most recent SCALANCE IWLAN Convergence Software release.

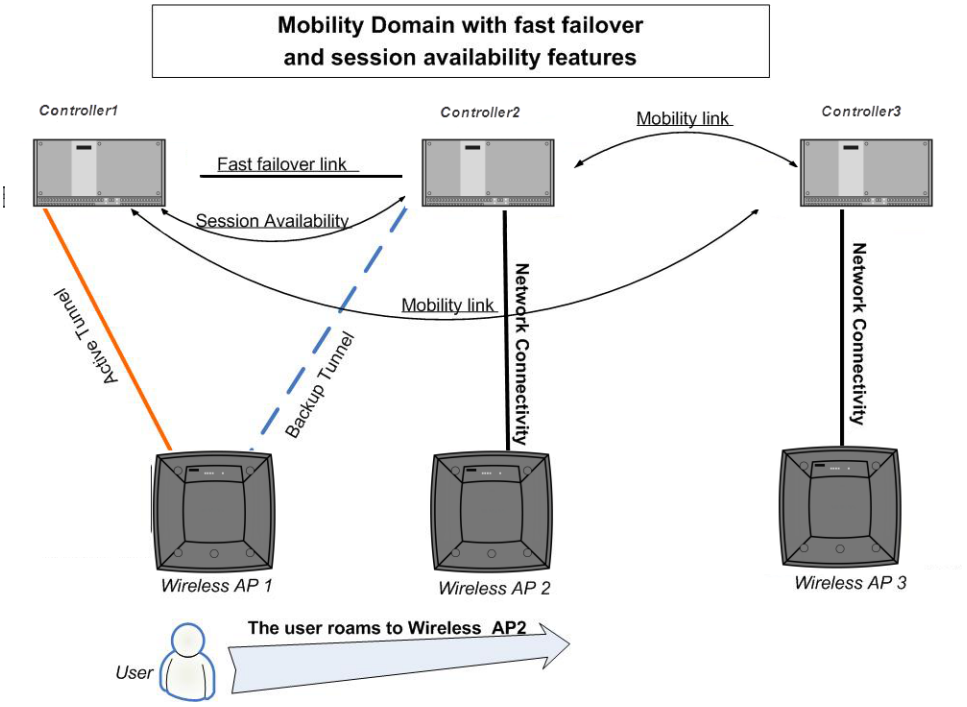
Mobility Domain Topologies

You can configure a mobility domain in the following scenarios:

- Mobility domain without any availability
- Mobility domain with availability
- Mobility domain with session availability

Note:
If you are configuring mobility, you must synchronize time on all the SCALANCE IWLAN Controllers that are part of the mobility domain. For more information, see “Configuring Network Time” on page 2-49.

Figure 13-1 Mobility Domain with Fast Failover and Session Availability Features



• Controller1 and Controller 2 are configured for session availability.

• Controller1, Controller2, Controller3, Wireless AP1, Wireless AP2 and Wireless AP3 form a Mobility Domain

• Controller3 is the Mobility Manager whereas Controller1 and Controller2 are Mobility Agents

- The user’s home session is with Controller1.
- When the user roams from Wireless AP 1 to Wireless AP 2, he establishes his home session with Controller2.
- When the user roams, the Wireless AP 1 receives a notification that the user has roamed away following which it marks the user session as “inactive”. Consequently, no statistics are sent to the Controller1 for that user.
- In response to the heart beat message from the mobility manager (Controller3), the Controller2 sends updates that the user has a new home on Controller2. Upon receiving the updates, the mobility manager updates its own tables.

Note:
The mobility manager’s heart beat time is configurable. If you are configuring a mobility domain with session availability, you should configure the heart beat time as one second to enable the mobility manager to update its tables quickly.

- If a failover takes place, and the user is still associated with Wireless AP1:
  - The Wireless AP 1 fails over, and establishes an active session with Controller2.
  - In response to the heart beat message from the mobility manager (Controller3), the Controller2 sends updates to the mobility manager on the failover Wireless AP and its user.
- If a failover takes place, and the user has roamed to Wireless AP 2:
  - As part of roaming, the user's home session moves from Controller1 to Controller2.
  - Wireless AP 1 establishes active session with Controller2. Wireless AP 2 is not impacted by the failover.

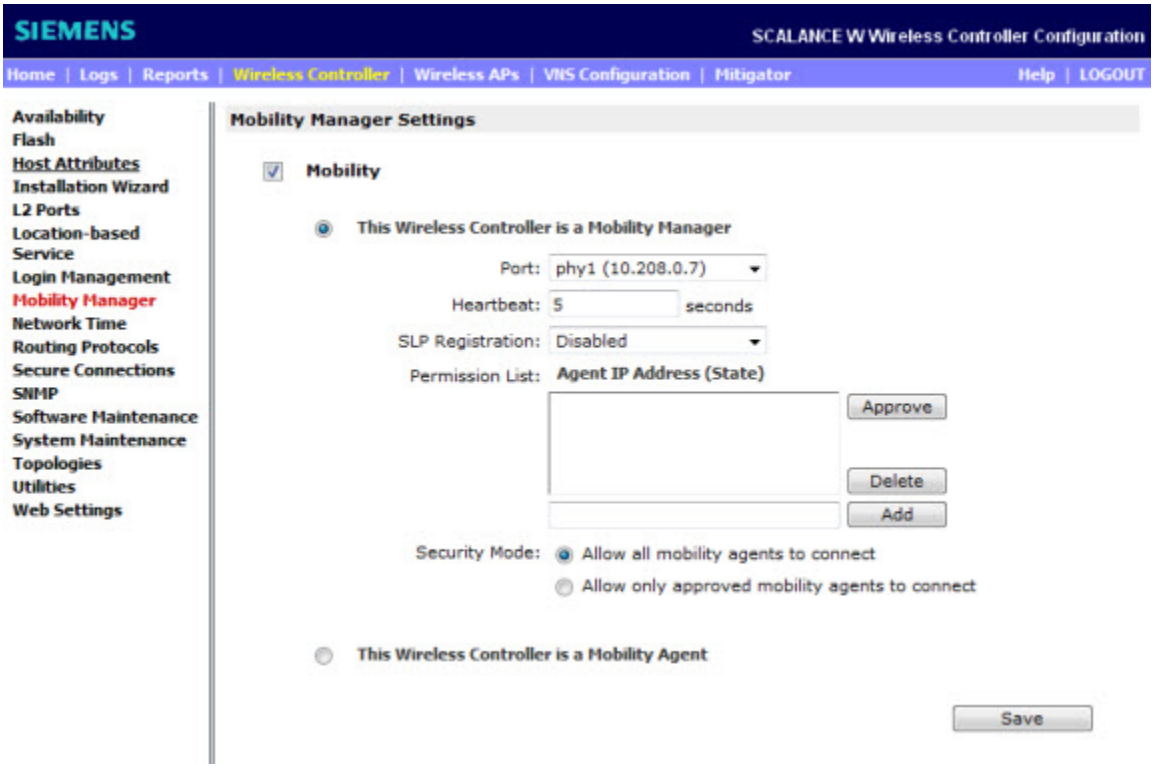
Configuring a Mobility Domain

If you are configuring a mobility domain with availability or session availability, you must synchronize time on all the SCALANCE IWLAN Controllers that are part of your mobility domain. For more information, see "Configuring Network Time" on page 2-49.

Designating a Mobility Manager

To Designate a Mobility Manager:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **Mobility Manager**. The **Mobility Manager Settings** screen is displayed.



3. To enable mobility for this controller, select the **Enable Mobility** checkbox. The controller mobility options are displayed.
4. Select the **This Wireless Controller is a Mobility Manager** option. The mobility manager options are displayed.
5. In the **Port** drop-down list, select the **interface** on the SCALANCE IWLAN Controller to be used for the mobility manager process. Ensure that the selected interface's IP address is routable on the network.
6. In the **Heartbeat** box, type the time interval (in seconds) at which the mobility manager sends a Heartbeat message to a mobility agent.

Note:
If the mobility domain is configured for fast failover and session availability, you should configure the mobility manager's heart beat time as one second.

7. In the **SLP Registration** drop-down list, select whether to enable or disable SLP registration.
8. In the **Permission** list, select the agent IP addresses you want to approve that are in pending state, by selecting the agent and clicking **Approve**. New agents are only added to the domain if they are approved.

   You can also add or delete controllers that you want to be part of the mobility domain. To add a controller, type the agent IP address in the box, and then click **Add**. To delete a controller, click the controller in the list, and then click **Delete**.
9. Select the **Security Mode** option:
   - **Allow all mobility agents to connect** — All mobility agents can connect to the mobility manager.
   - **Allow only approved mobility agents to connect** — Only approved mobility agents can connect to the mobility manager.
10. To save your changes, click **Save**.

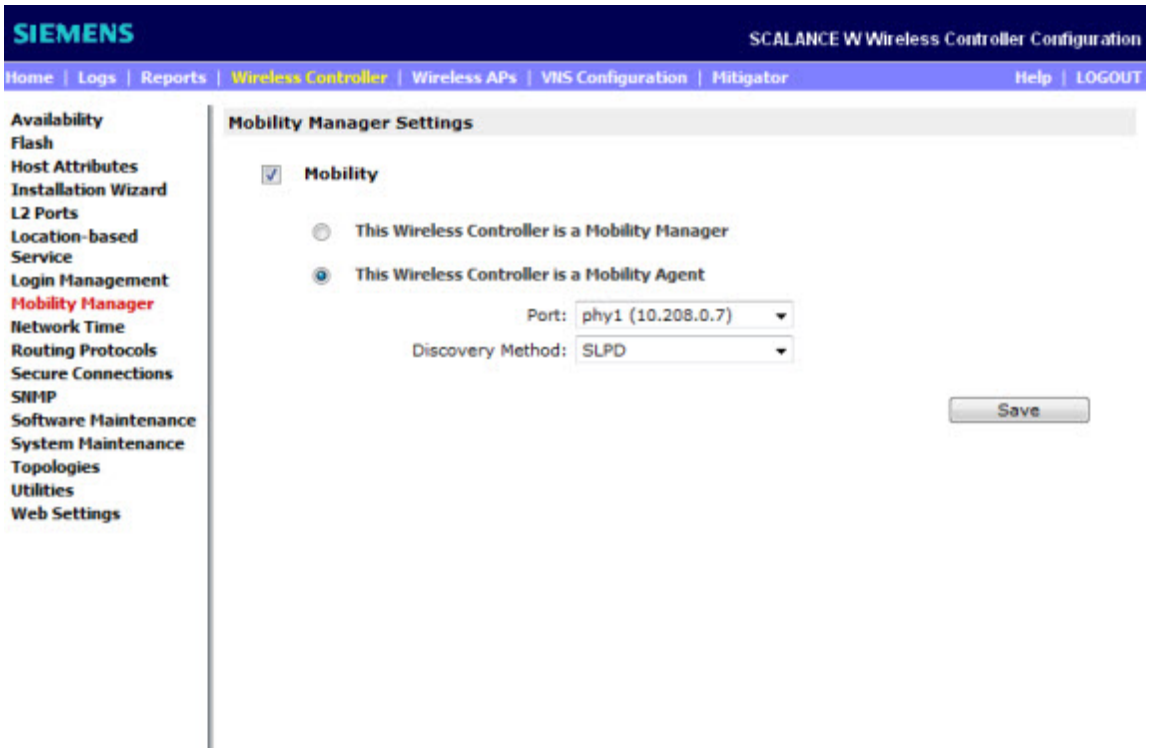
Note:
If you set up one SCALANCE IWLAN Controller on the network as a mobility manager, all other SCALANCE IWLAN Controllers must be set up as mobility agents.

Designating a Mobility Agent

To Designate a Mobility Agent:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **Mobility Manager**. The **Mobility Manager Settings** screen is displayed.
3. To enable mobility for this controller, select the **Enable Mobility** checkbox. The controller mobility options are displayed.

4. Select the **This Wireless Controller is a Mobility Agent** option. The mobility agent options are displayed.



5. From the **Port** drop-down list, select the **port** on the SCALANCE IWLAN Controller to be used for the mobility agent process. Ensure that the port selected is routable on the network.
6. From the **Discovery Method** drop-down list, select one of the following:
   - **SLPD** — Service Location Protocol Daemon, a background process acting as an SLP server, provides the functionality of the Directory Agent and Service Agent for SLP. Use SLP to support the discovery of SiemensNET service to attempt to locate the area mobility manager controller.
   - **Static Configuration** — You must provide the IP address of the mobility manager manually. Defining a static configuration for a mobility manager IP address bypasses SLP discovery.

     In the **Mobility Manager Address** box, type the IP address for the designated mobility manager.
7. To save your changes, click **Save**.

For information about viewing mobility manager displays, see "Viewing Mobility Reports" on page 16-16.

14

Working with Third-party APs

You can set up the SCALANCE IWLAN Controller to handle wireless device traffic from third-party APs, while still providing policy and network access control. This process requires the following steps:

For information about...	Refer to page...
Define Authentication by Captive Portal for the Third-party AP WLAN Service	14-1
Define the Third-party APs List	14-1
Define Filtering Rules for the Third-party APs	14-2

Define Authentication by Captive Portal for the Third-party AP WLAN Service

802.1x Authentication is not supported directly by the SCALANCE IWLAN Controller. However, this type of authentication can be supported by the actual third-party AP. All other options for authentication are supported at the controller.

1. On the WLAN configuration window for the third-party WLAN Service, click the **Auth & Acct** tab.
2. In the **Authentication Mode** drop-down list, click **Internal** or **External**, then click the **Configure** button.
3. Define the Captive Portal configuration as described in "Configuring Captive Portal for Internal Authentication" on page 6-25.

Define the Third-party APs List

1. In the **WLAN Services** panel, select the third-party WLAN Service.
2. In the **IP Address** field, type the IP address of a third-party AP.
3. In the **Wired MAC Address** field, type the MAC address of the AP.
4. Click the **Add** button to add the AP to the list.
5. Repeat for all third-party APs to be assigned to this WLAN Service.

Define Filtering Rules for the Third-party APs

1. Because the third-party APs are mapped to a physical topology, you must define the Exception filters on the physical topology, using the **Exception Filters** tab. For more information, see “Exception Filtering” on page 4-11.
2. Define filtering rules that allow access to other services and protocols on the network such as HTTP, FTP, telnet, SNMP.
3. On the **Multicast Filters** tab, select **Enable Multicast Support** and configure the multicast groups whose traffic is allowed to be forwarded to and from the VNS using this topology. For more information, see “Multicast Filtering” on page 4-15.

In addition, modify the following functions on the third-party AP:

- Disable the AP's DHCP server, so that the IP address assignment for any wireless device on the AP is from the DHCP server at the SCALANCE IWLAN Controller with VNS information.
- Disable the third-party AP's layer-3 IP routing capability and set the access point to work as a layer-2 bridge.

The following are the differences between third-party APs and Wireless APs on the SCALANCE IWLAN Controller system:

- A third-party AP exchanges data with the SCALANCE IWLAN Controller's data port using standard IP over Ethernet protocol. The third-party access points do not support the tunnelling protocol for encapsulation.
- For third-party APs, the VNS is mapped to the physical data port and this is the default gateway for mobile units supported by the third-party access points.
- A SCALANCE IWLAN Controller cannot directly control or manage the configuration of a third-party access point.
- Third-party APs are required to broadcast an SSID unique to their segment. This SSID cannot be used by any other VNS.
- Roaming from third-party APs to Wireless APs and vice versa is not supported.

15

Working with the Mitigator

This chapter describes Mitigator concepts, including:

For information about...	Refer to page...
Mitigator Overview	15-1
Analysis Engine Overview	15-2
Enabling the Analysis Engine	15-2
Viewing the Mitigator Logs	15-3
Running Mitigator Scans	15-4
Working with Mitigator Scan Results	15-7
Maintaining the Mitigator List of APs	15-14
Viewing the Scanner Status Report	15-14

Mitigator Overview

The Mitigator is a mechanism that assists in the detection of rogue APs.

Mitigator functionality on the Wireless AP does the following:

- Runs a radio frequency (RF) scanning task.
- Alternating between scan functions, providing its regular service to the wireless devices on the network.

Note:
If a Wireless AP is part of a WDS/Mesh link you cannot configure it to act as a scanner in Mitigator.

Mitigator functionality on the SCALANCE IWLAN Controller does the following:

- Runs a data collector application that receives and manages the RF scan messages sent by the Wireless AP. RF data collector data includes lists of all connected Wireless APs, third-party APs, and the RF scan information that has been collected from the Wireless APs selected to perform the scan.
- Runs an Analysis Engine that processes the scan data from the data collector through algorithms that make decisions about whether any of the detected APs or clients are rogue APs or are running in an unsecure environment (for example, ad-hoc mode).

Note:
In a network with more than one SCALANCE IWLAN Controller, it is not necessary for the data collector to be running on the same controller as the Analysis Engine. One controller can be a dedicated Analysis Engine

while the other controllers run data collector functionality. No more than one Analysis Engine can be running at a time. You must ensure that the controllers are all routable.

Analysis Engine Overview

The Analysis Engine relies on a database of known devices on the SCALANCE WLC711 system. The Analysis Engine compares the data from the RF Data Collector with the database of known devices.

This database includes the following:

- **Wireless APs** — Registered with any SCALANCE IWLAN Controller with its RF Data Collector enabled and associated with the Analysis Engine on this SCALANCE IWLAN Controller.
- **Third-party APs** — Defined and assigned to a VNS.
- **Friendly APs** — A list created in the Mitigator user interface as potential rogue access points are designated by the administrator as Friendly.
- **Wireless devices** — Registered with any SCALANCE IWLAN Controller that has its RF Data Collector enabled and has been associated with the Analysis Engine on this SCALANCE IWLAN Controller.

The Analysis Engine identifies AP security threats and classifies them based on one or more of the following threat types:

- **Rogue AP** which includes:
  - Unknown MAC, with a valid SSID - a known SSID is being broadcast by the unknown access point (major alarm)
  - Known MAC, with an unknown SSID - a rogue may be spoofing a MAC address (major alarm)
  - Inactive Wireless AP with valid SSID (major alarm)
  - Inactive Wireless AP with unknown SSID (major alarm)
  - Known Wireless AP with an unknown SSID (major alarm)
- **External AP** - Unknown MAC address and unknown SSID (major alarm)
- **Device in ad-hoc mode** - major alarm

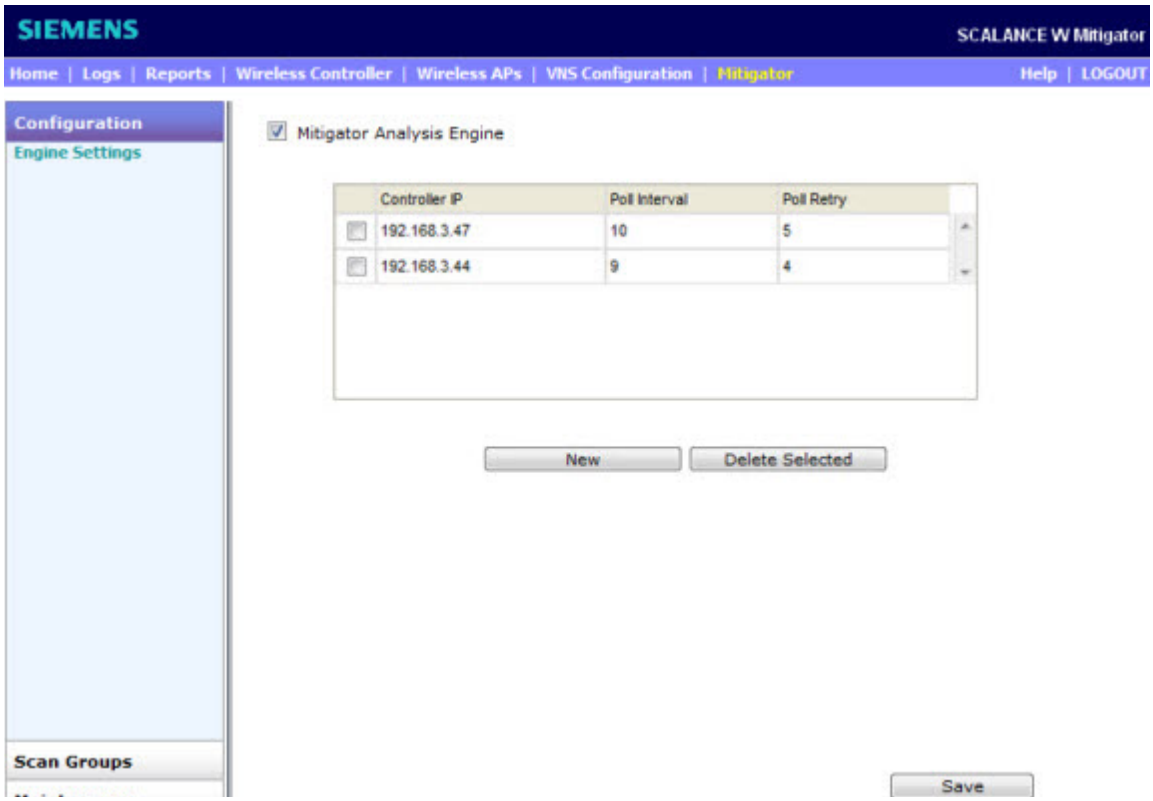
Note:
In the current release, there is no capability to initiate a DoS attack on the detected rogue access point. Containment of a detected rogue requires an inspection of the geographical location of its Scan Group area, where its RF activity has been found.

Enabling the Analysis Engine

Before using the Mitigator, you must enable the Analysis engine.

To Enable the Analysis Engine:

1. From the top menu, click **Mitigator**. The **Mitigator Configuration** screen is displayed.



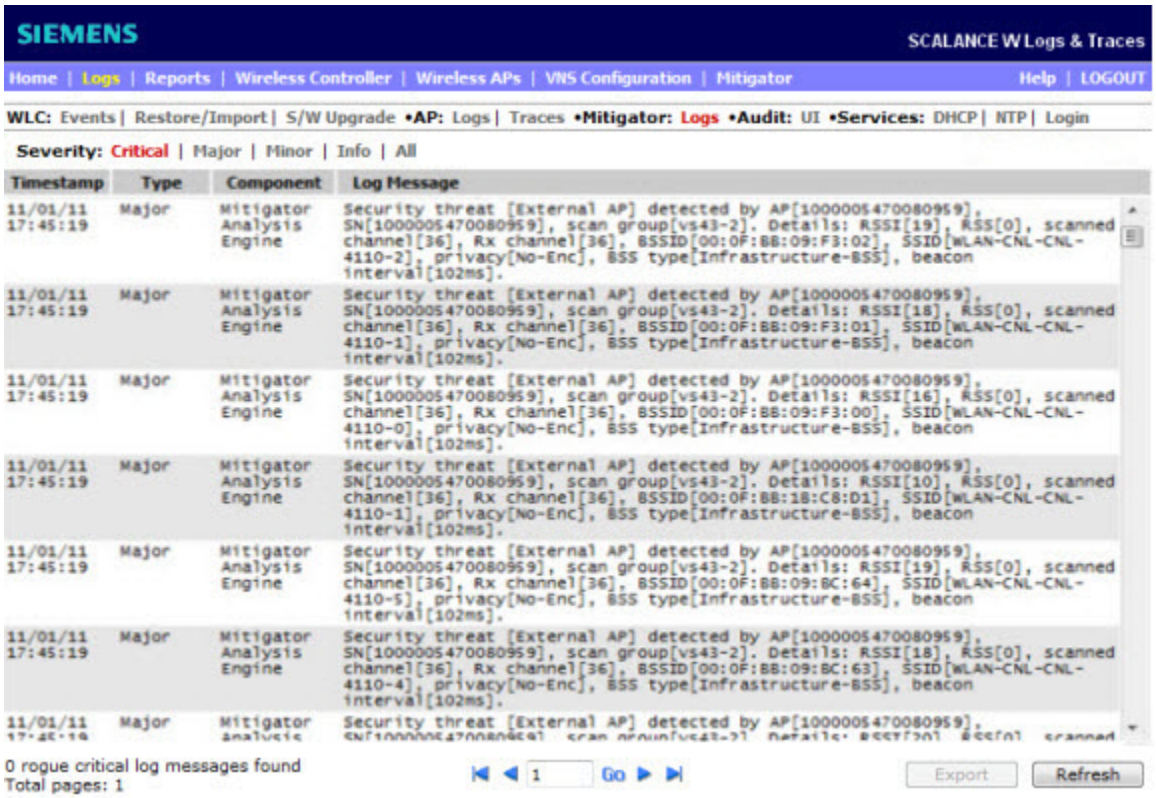
2. Enable the Mitigator Analysis Engine, by selecting the **Mitigator Analysis Engine** checkbox.

Viewing the Mitigator Logs

To View Mitigator Logs:

1. From the top menu, click **Logs**. The **Logs & Traces** screen is displayed.
2. From the Logs & Traces top menu, click **Mitigator: Logs**.

3. The **Mitigator Logs** page is displayed.


SIEMENS
SCALANCE W Logs & Traces
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
WLC: Events | Restore/Import | S/W Upgrade •AP: Logs | Traces •Mitigator: Logs •Audit: UI •Services: DHCP | NTP | Login
Severity: Critical | Major | Minor | Info | All
Timestamp
Type
Component
Log Message
11/01/11 17:45:19
Major
Mitigator Analysis Engine
Security threat [External AP] detected by AP[1000005470080959], SN[1000005470080959], scan group[vs43-2]. Details: RSSI[19], RSS[0], scanned channel[36], Rx channel[36], BSSID[00:0F:BB:09:F3:02], SSID[WLAN-CNL-CNL-4110-2], privacy[No-Enc], BSS type[Infrastructure-BSS], beacon interval[102ms].
Security threat [External AP] detected by AP[1000005470080959], SN[1000005470080959], scan group[vs43-2]. Details: RSSI[18], RSS[0], scanned channel[36], Rx channel[36], BSSID[00:0F:BB:09:F3:01], SSID[WLAN-CNL-CNL-4110-1], privacy[No-Enc], BSS type[Infrastructure-BSS], beacon interval[102ms].
Security threat [External AP] detected by AP[1000005470080959], SN[1000005470080959], scan group[vs43-2]. Details: RSSI[16], RSS[0], scanned channel[36], Rx channel[36], BSSID[00:0F:BB:09:F3:00], SSID[WLAN-CNL-CNL-4110-0], privacy[No-Enc], BSS type[Infrastructure-BSS], beacon interval[102ms].
Security threat [External AP] detected by AP[1000005470080959], SN[1000005470080959], scan group[vs43-2]. Details: RSSI[10], RSS[0], scanned channel[36], Rx channel[36], BSSID[00:0F:BB:18:C8:D1], SSID[WLAN-CNL-CNL-4110-1], privacy[No-Enc], BSS type[Infrastructure-BSS], beacon interval[102ms].
Security threat [External AP] detected by AP[1000005470080959], SN[1000005470080959], scan group[vs43-2]. Details: RSSI[19], RSS[0], scanned channel[36], Rx channel[36], BSSID[00:0F:BB:09:BC:64], SSID[WLAN-CNL-CNL-4110-5], privacy[No-Enc], BSS type[Infrastructure-BSS], beacon interval[102ms].
Security threat [External AP] detected by AP[1000005470080959], SN[1000005470080959], scan group[vs43-2]. Details: RSSI[18], RSS[0], scanned channel[36], Rx channel[36], BSSID[00:0F:BB:09:BC:63], SSID[WLAN-CNL-CNL-4110-4], privacy[No-Enc], BSS type[Infrastructure-BSS], beacon interval[102ms].
11/01/11
Major
Mitigator Analysis
Security threat [External AP] detected by AP[1000005470080959],
0 rogue critical log messages found
Total pages: 1
1
Go
Export
Refresh

4. To filter the log events by severity, **Critical**, **Major**, **Minor**, **Info**, **All**, and **Trace**, click the appropriate log severity. The log messages are displayed in chronological order.
5. To sort the events by **Timestamp, Type, Component**, or **Log Message**, click the appropriate column heading.
6. To refresh the Mitigator log screen, click **Refresh**.
7. To export the Mitigator log screen, click **Export**. The **File Download** dialog is displayed.
8. Do one of the following:
   - To open the log file, click **Open**.
   - To save the log file, click **Save** and then navigate to the directory location you want to save the file. The file is saved as a .log file. Click **Save**.

Running Mitigator Scans

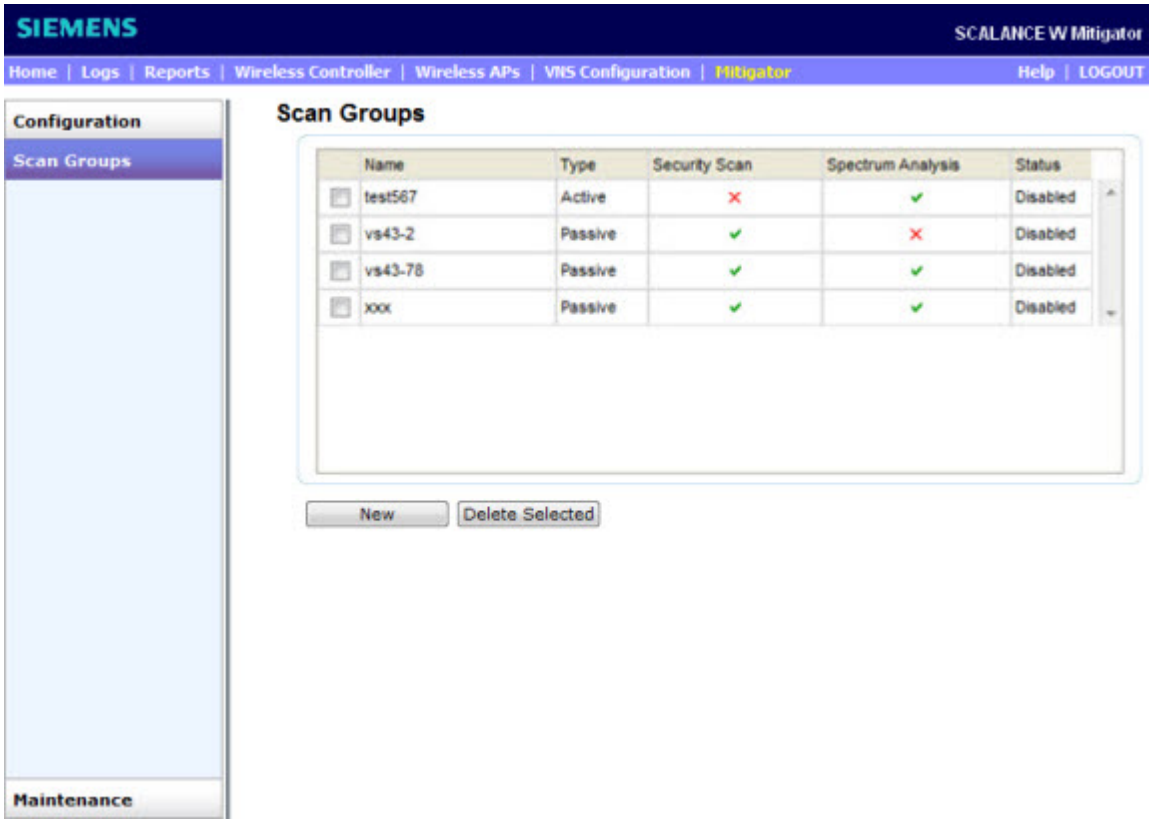
The Mitigator feature allows you to run the following scans:

- Scan Groups
- Scan APs
- Friendly APs

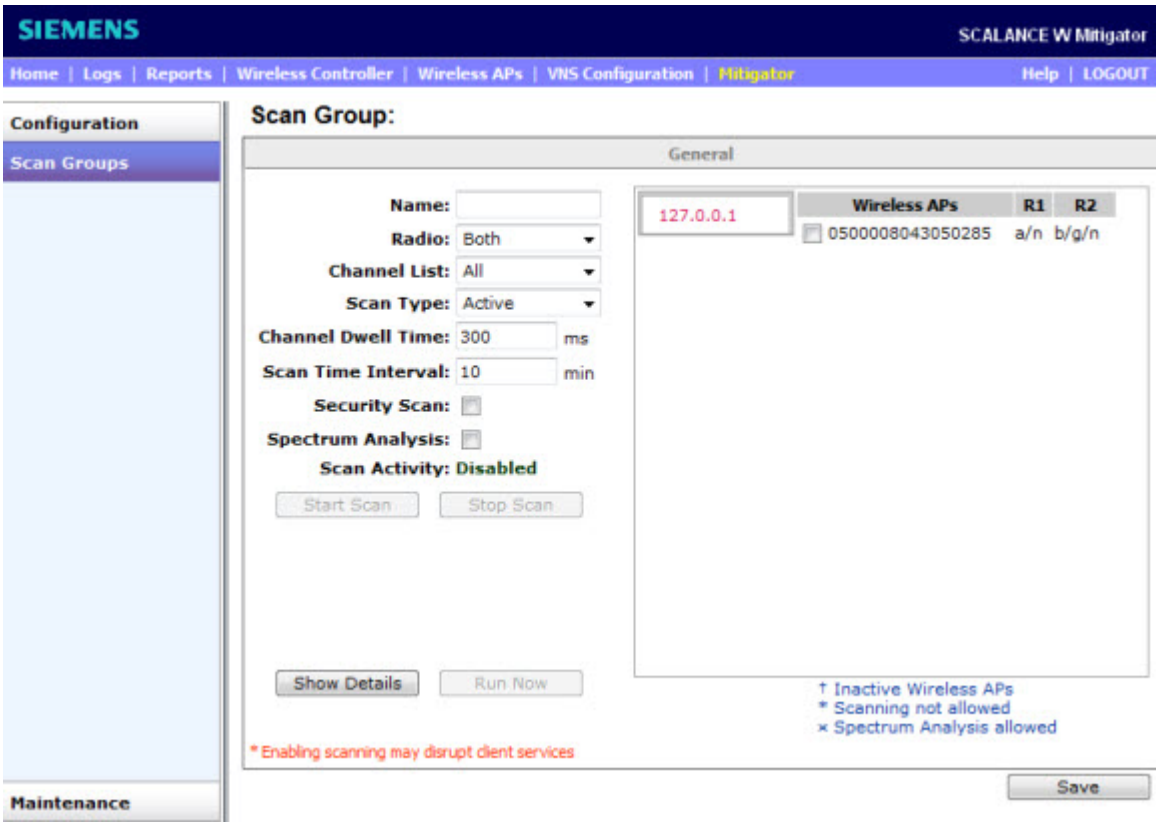
Note:
A scan will not run on an inactive AP, even though it is displayed as part of the Scan Group. If it becomes active, it will be sent a scan request during the next periodic scan.

To Run the Mitigator Scan Task Mechanism:

1. From the top menu, click **Mitigator**. The **Mitigator** screen is displayed.
2. From the left pane, click **Scan Groups.**



3. Select an existing Scan Group from the list displayed, or click **New** to create a new scan group.



4. In the **Name** box, type a unique name for this scan group.
5. In the **Wireless APs** list, select the checkbox corresponding to the Wireless APs you want included in the new scan group, which will perform the scan function.

Note:
A Wireless AP can participate in only one Scan Group at a time. Siemens recommends that the Scan Groups represent geographical groupings of Wireless APs.

6. In the **Radio** drop-down list, click one of the following:
   - **Both — Radio 1 and Radio 2 both** perform the scan function.
   - **radio 1 — Only Radio 1** performs the scan function.
   - **radio 2 — Only Radio 2** performs the scan function.
7. In the **Channel List** drop-down list, click one of the following:
   - **All — Scanning is performed on all channels.**
   - **Current** — Scanning is performed on only the current channel.
8. In the **Scan Type** drop-down list, click one of the following:
   - **Active** — The Wireless AP sends out ProbeRequests and waits for ProbeResponse messages from any access points.
   - **Passive** — The Wireless AP listens for 802.11 beacons.

9. In the **Channel Dwell Time** box, type the time (in milliseconds) for the scanner to wait for a response from either 802.11 beacons in passive scanning, or ProbeResponse in active scanning.
10. In the **Scan Time Interval** box, type the time (in minutes) to define the frequency at which a Wireless AP within the Scan Group will initiate a scan of the RF space. The range is between 10 minutes and 120 minutes.
11. Select the **Security Scan** and/or **Spectrum Analysis** checkbox to induce the following behavior on the AP (selecting the checkbox turns the feature ON):
    - When Spectrum Analysis is OFF and Security Scan is ON, the AP will perform security/ rogue scanning as in previous releases.
    - When Spectrum Analysis is ON and Security Scan is OFF, the AP will perform spectrum analysis scanning on the current channel.
    - When Spectrum Analysis is ON and Security Scan is ON (for the current channel), the AP will perform spectrum analysis scanning on the current channel at all times (whether the security/rogue scanning is in progress or not.)
    - When Spectrum Analysis is ON and Security Scan is ON (for all channels), the AP will perform spectrum analysis scanning on the current channel whenever the security/rogue scanning is not in progress (between scan intervals) and on the channel that is being scanned during the security/rogue scanning (service disruptive channel switching).
12. To initiate a scan using the periodic scanning parameters defined above, click **Start Scan**.
13. To initiate an immediate scan that will run only once, click **Run Now**.The **Scan Activity** box displays the current state of the scan engine.
14. To view a pop-up report displaying the timeline of scan activity and scan results, click **Show Details**.
15. To save your changes, click **Save**.

Working with Mitigator Scan Results

When viewing the Mitigator scan results, you can delete individual or all of the access points from the scan results. You can also add access points from the scan results to the **Friendly AP** list.The Mitigator report separates the scanned results into one of the following tabs:

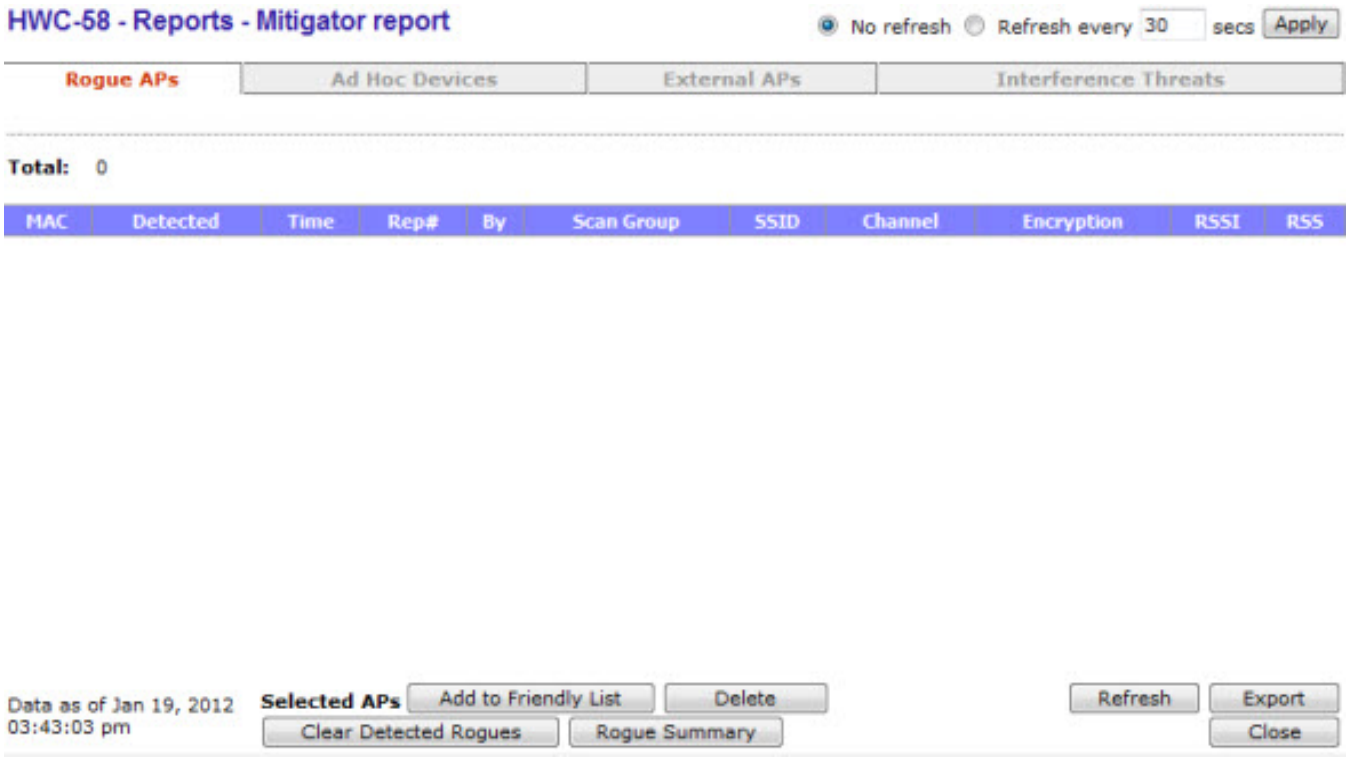
- Rogue APs
- Ad Hoc Devices
- External APs
- Interference Threats

Viewing Mitigator Scan Results

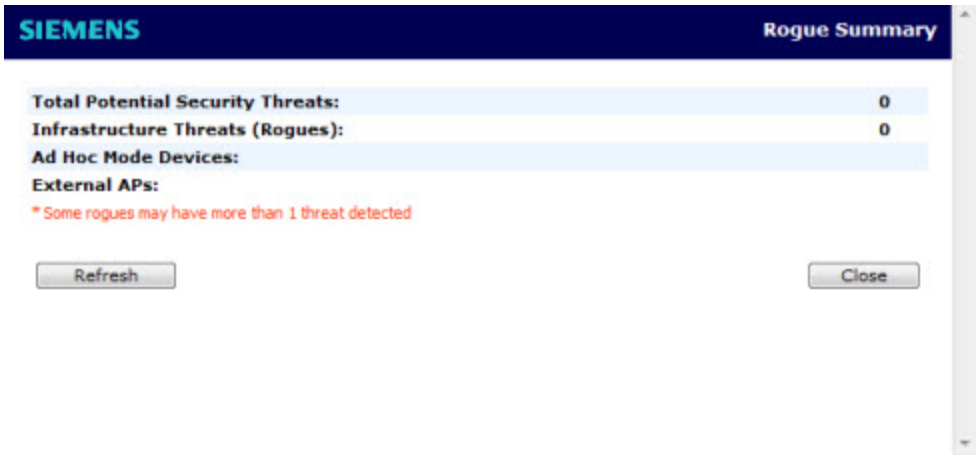
To View Rogue AP Scan Results

1. From the top menu, click **Reports**.

2. In the left pane, under Mitigator, click **Mitigator Information**. The **Mitigator Reports** screen is displayed.



3. To modify the page's refresh rate, type a time (in seconds) in the **Refresh every __ seconds** box.
4. Click **Apply**. The new refresh rate is applied.
5. To view the Rogue Summary report, click **Rogue Summary**. The Rogue Summary report is displayed in a pop-up window.

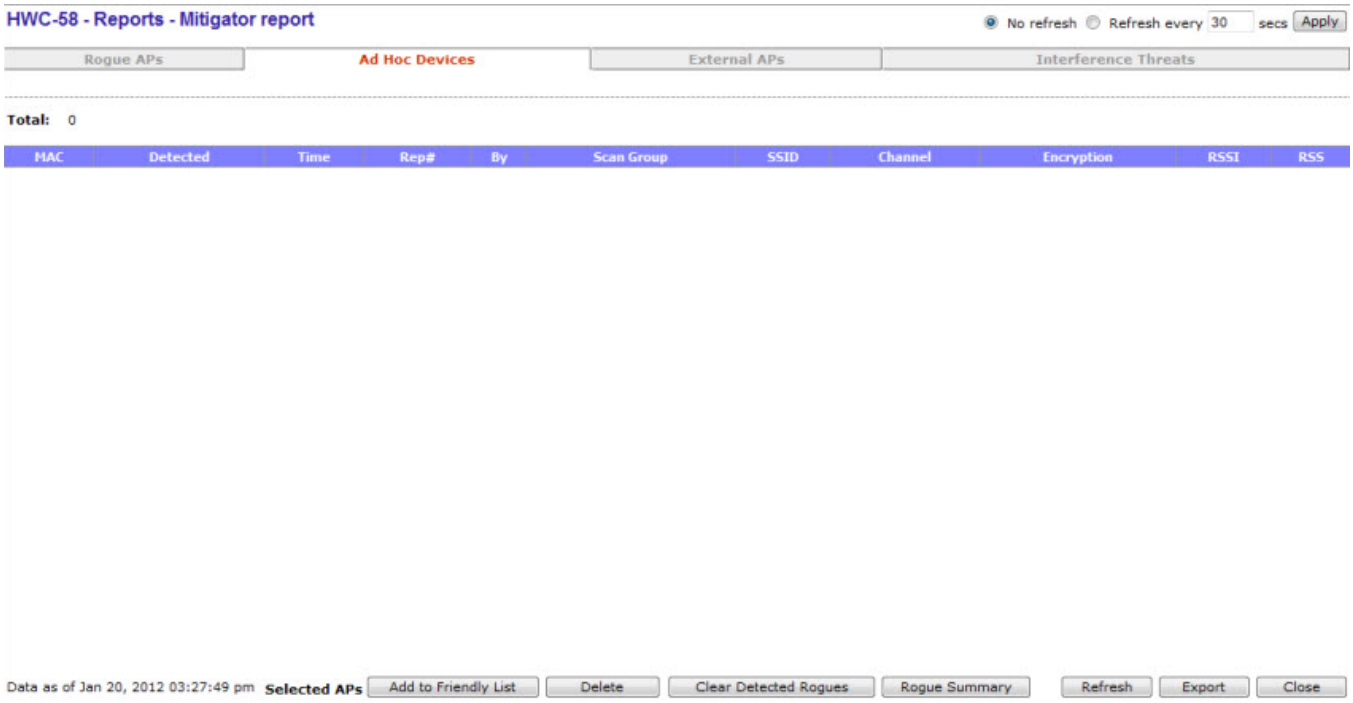


6. To clear all detected rogue devices from the list, click **Clear Detected Rogues**.

Note:
To avoid the Mitigator's database becoming too large, Siemens recommends that you either delete Rogue APs or add them to the **Friendly APs** list, rather than leaving them in the **Rogue** list.

To View Ad Hoc Devices Scan Results

1. From the top menu, click **Reports**.
2. In the left pane, under Mitigator, click **Mitigator Information**.
3. On the Mitigator Report page, click the **Ad Hoc Devices** tab. The **Ad Hoc** screen is displayed.

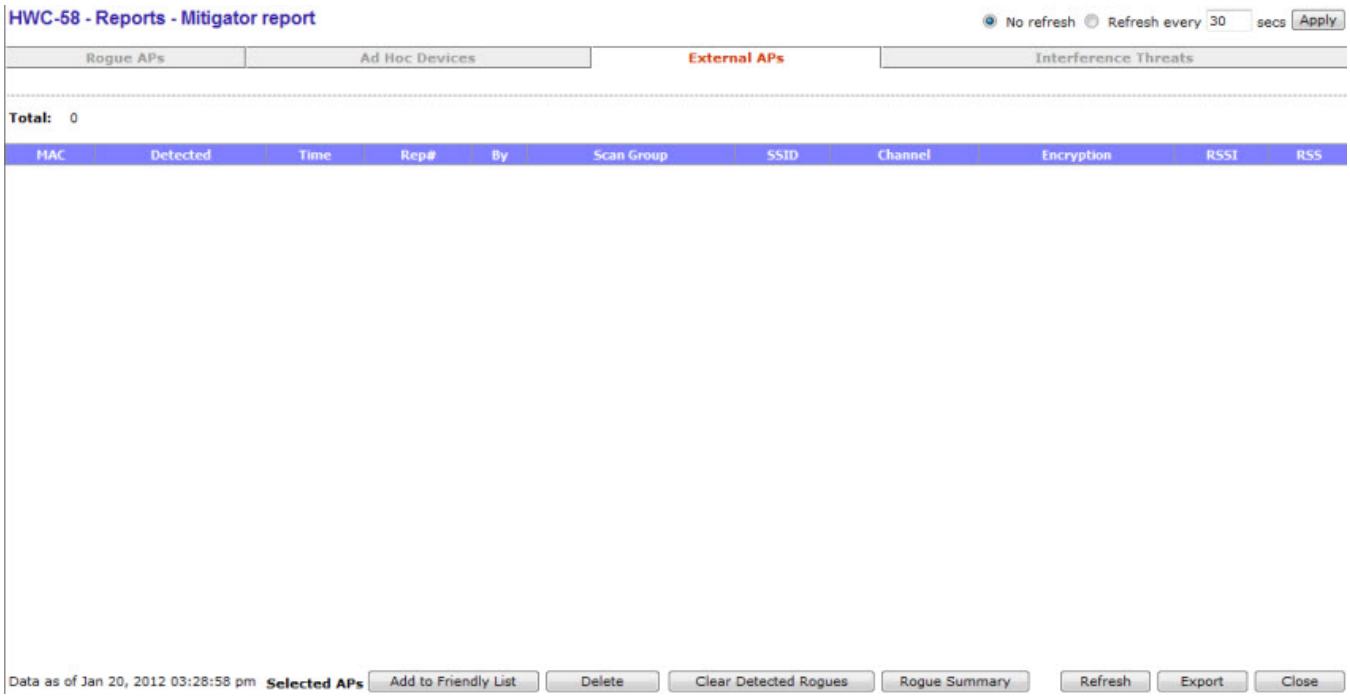


4. To refresh the page, click **Refresh**.
5. To clear all detected rogue devices from the list, click **Clear Detected Rogues**.

To View External APs Scan Results

1. From the top menu, click **Reports**.
2. In the left pane, under Mitigator, click **Mitigator Information**.

3. On the Mitigator Report page, click the **External APs** tab. The **External APs** screen is displayed.

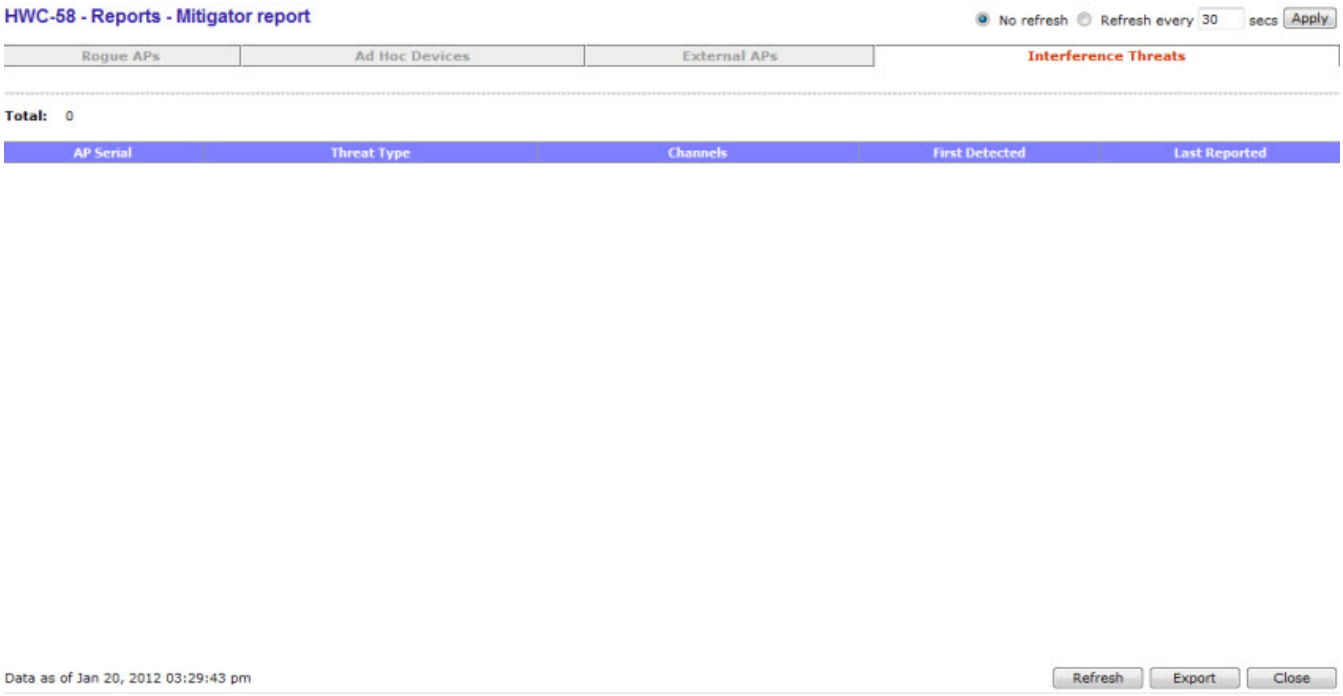


4. To refresh the page, click **Refresh**.
5. To clear all detected rogue devices from the list, click **Clear Detected Rogues**.

To View Interference Threats Scan Results

1. From the top menu, click **Reports**.
2. In the left pane, under Mitigator, click **Mitigator Information**.

3. On the Mitigator Report page, click the **Interference Threats** tab. The **Interference Threats** screen is displayed.



4. To refresh the page, click **Refresh**.
5. To clear all detected rogue devices from the list, click **Clear Detected Rogues**.

Adding an AP from the Scan Results to the List of Friendly APs

To Add an AP from the Mitigator Scan Results to the List of Friendly APs:

1. From the top menu, click **Reports**.
2. In the left pane, under Mitigator, click **Mitigator Information**. The **Mitigator Reports** screen is displayed.
3. On the Mitigator Reports page, click the **Rogue APs** tab.
4. To add a Wireless AP to the **Friendly APs** list, click **Add to Friendly List**. The AP is removed from this list and is displayed in the **Friendly AP Definitions** section of the **Friendly AP's** tab.

Deleting an AP from the Scan Results

To Delete an AP from the Mitigator Scan Results:

1. From the top menu, click **Reports**.
2. In the left pane, under Mitigator, click **Mitigator Information**. The **Mitigator Reports** screen is displayed.
3. On the Mitigator Reports page, click the **Rogue APs** tab.
4. To delete a specific AP from the Mitigator scan results, click the corresponding **Delete** button. The AP is removed from the list.

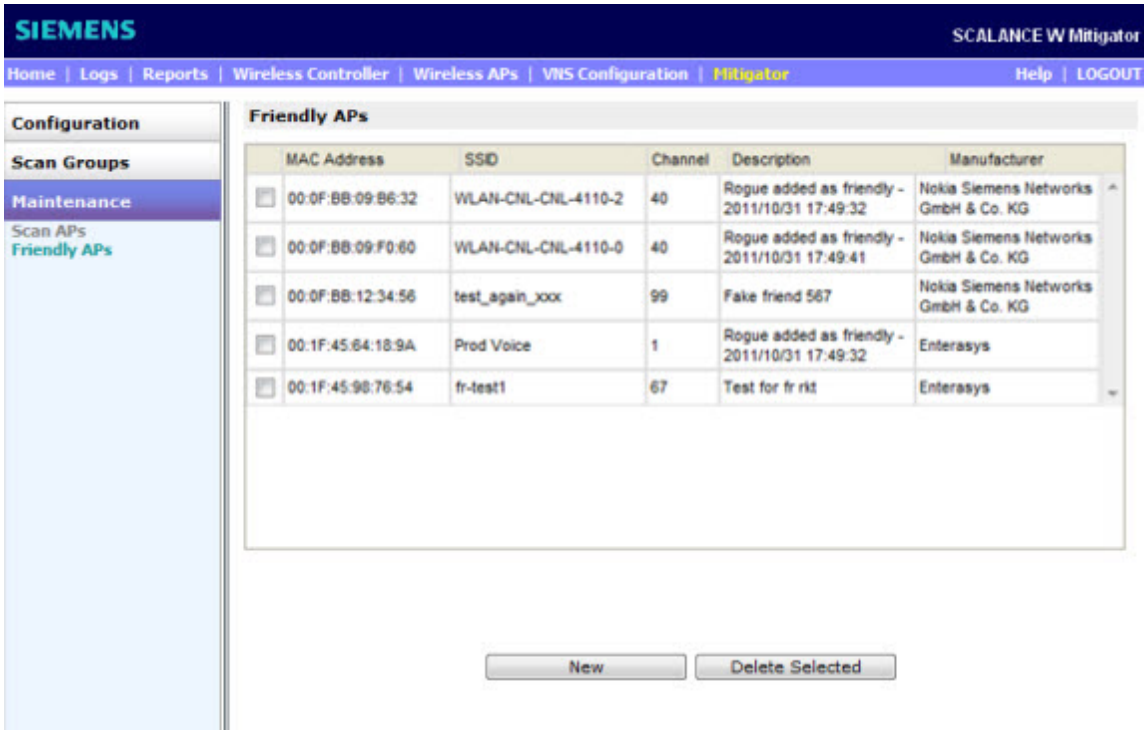
5. To clear all rogue access points from the Mitigator scan results, click **Clear Detected Rogues**.

Note:
Only detected rogue APs will be cleared from the list. Other interference threats will remain.

Viewing Friendly APs

To View the Friendly APs:

1. From the top menu, click **Mitigator**. The **Mitigator** screen is displayed.
2. In the left pane, under Maintenance, click **Friendly APs**. The **Friendly APs** screen is displayed.

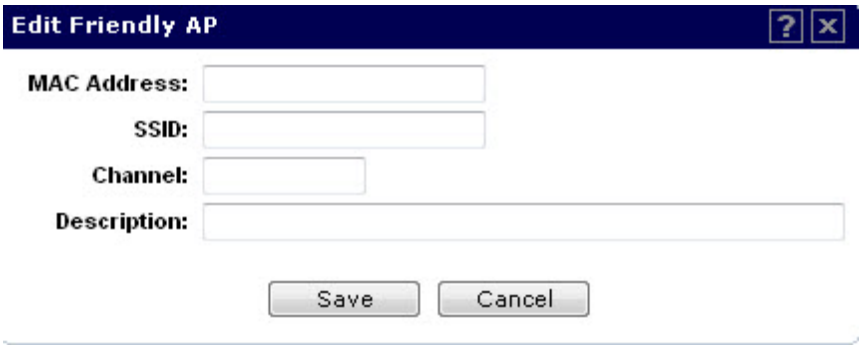


Adding Friendly APs Manually

To Add Friendly APs Manually:

1. From the top menu, click **Mitigator**. The **Mitigator** screen is displayed.
2. In the left pane, under Maintenance, click **Friendly APs**. The **Friendly APs** screen is displayed.

3. To add friendly access points manually to the **Friendly AP Definitions** list, click **New**.The Edit Friendly AP dialog displays.



4. In the Edit Friendly AP dialog, type the following:
   - **MAC Address** — Specifies the MAC address for the friendly AP
   - **SSID** — Specifies the SSID for the friendly AP
   - **Channel** — Specifies the current operating channel for the friendly AP
   - **Description** — Specifies a brief description for the friendly AP
5. Click **Save**. The new access point is displayed in the Friendly APs list.

Deleting Friendly APs

To Delete a Friendly AP:

1. From the top menu, click **Mitigator**. The **Mitigator** screen is displayed.
2. In the left pane, under Maintenance, click **Friendly APs**. The **Friendly APs** screen is displayed.
3. In the **Friendly APs** list, click the access point you want to delete.
4. Click **Delete Selected**. The selected access point is removed from the **Friendly APs** list.
5. To save your changes, click **Save**.

Modifying Friendly APs

To Modify a Friendly AP:

1. From the top menu, click **Mitigator**. The **Mitigator** screen is displayed.
2. In the left pane, under Maintenance, click **Friendly APs**. The **Friendly APs** screen is displayed.
3. In the **Friendly APs** list, click the access point you want to modify.
4. Modify the access point by making the appropriate changes.

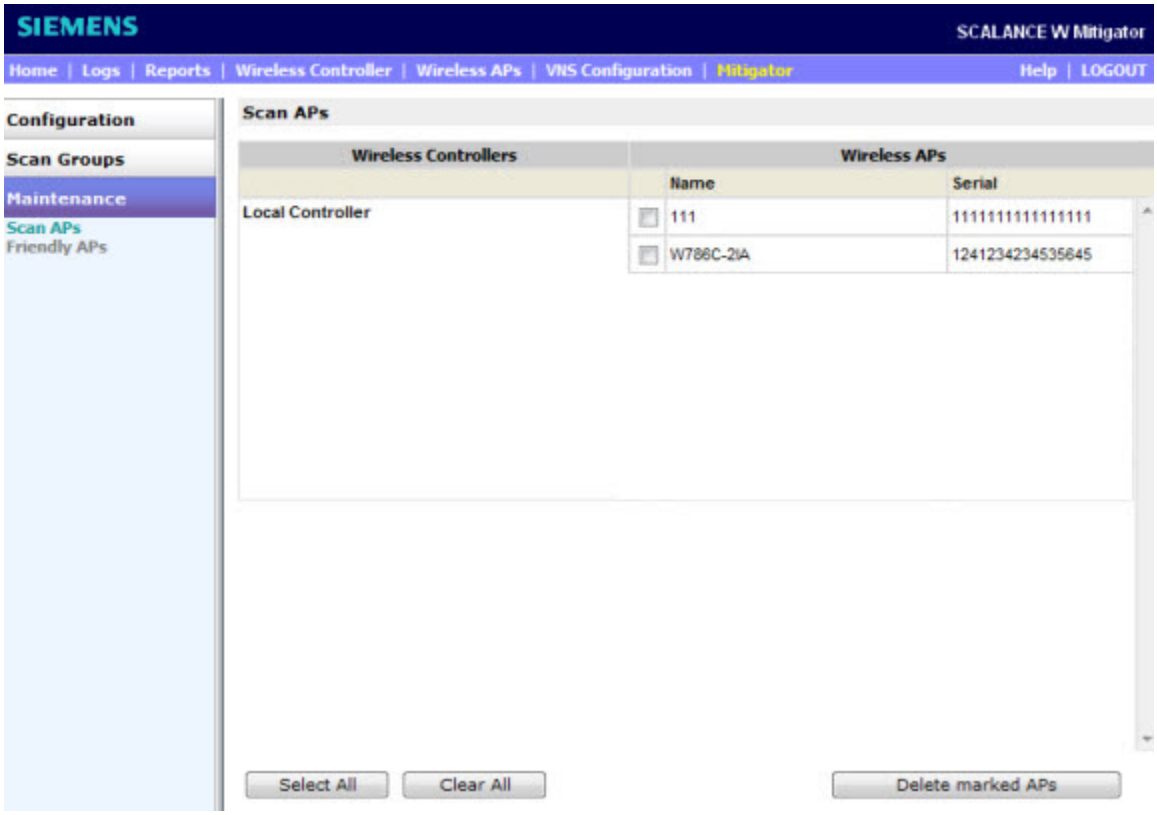
Note:
The MAC Address field cannot be modified.

5. To save your changes, click **Save**.

Maintaining the Mitigator List of APs

To Maintain the Wireless APs:

1. From the top menu, click **Mitigator**. The **Mitigator** screen is displayed.
2. In the left pane, under Maintenance, click **Scan APs**. The **Scan APs** screen is displayed.



3. Select the applicable APs.
4. To delete the selected APs, click **Delete marked APs**

Note:
The selected APs are deleted from the Mitigator database, not from the SCALANCE IWLAN Controller database. You can delete the APs from the SCALANCE IWLAN Controller database after you delete them from the Wireless AP Configuration **Access Approval** screen of the corresponding RF Data Collector Engine. You can also delete the selected third-party APs if they are removed from the corresponding VNS in the RF Collector Engine, or if that VNS has been deleted from the VNS list.

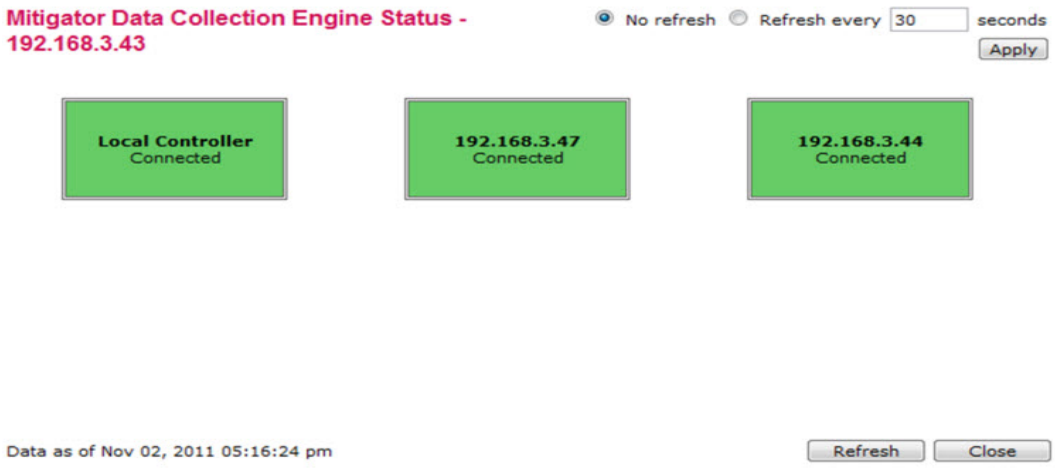
Viewing the Scanner Status Report

When the Mitigator is enabled, you can view a report on the connection status of the RF Data Collector Engines with the Analysis Engine.

To View the Mitigator Scanner Engine Status Display:

1. From the top menu, click **Reports**.

2. In the left pane, under Mitigator, click **Data Collection Engine Status**. The **Mitigator Data Collection Engine Status** screen is displayed.



The boxes display the IP address of the Data Collector engine. The status of the Data Collector engine is indicated by one of the following colors:

- **Green** — The Analysis Engine has connection with the Data Collector on that SCALANCE IWLAN Controller.
- **Yellow** — The Analysis Engine has connected to the communication system of the other controller, but has not synchronized with the Data Collector. Ensure that the Data Collector is running on the remote controller.
- **Red** — The Analysis Engine is aware of the Data Collector and attempting connection.

If no box is displayed, the Analysis Engine is not attempting to connect with that Data Collector Engine.

Note:
If the box is displayed red and remains red, ensure your IP address is correctly set up to point to an active controller. If the box remains yellow, ensure the Data Collector is running on the remote controller.

16

Working with Reports and Statistics

This chapter describes the various reports and statistics available in the SCALANCE WLC711 system.

For information about...	Refer to page...
Available Reports and Statistics	16-1
Viewing AP Reports and Statistics	16-2
Viewing Active Clients	16-12
Viewing Policy Filter Statistics	16-13
Viewing Topology Statistics	16-14
Viewing Mobility Reports	16-16
Viewing Controller Status Information	16-19
Viewing Routing Protocol Reports	16-20
Call Detail Records (CDRs)	16-21

Available Reports and Statistics

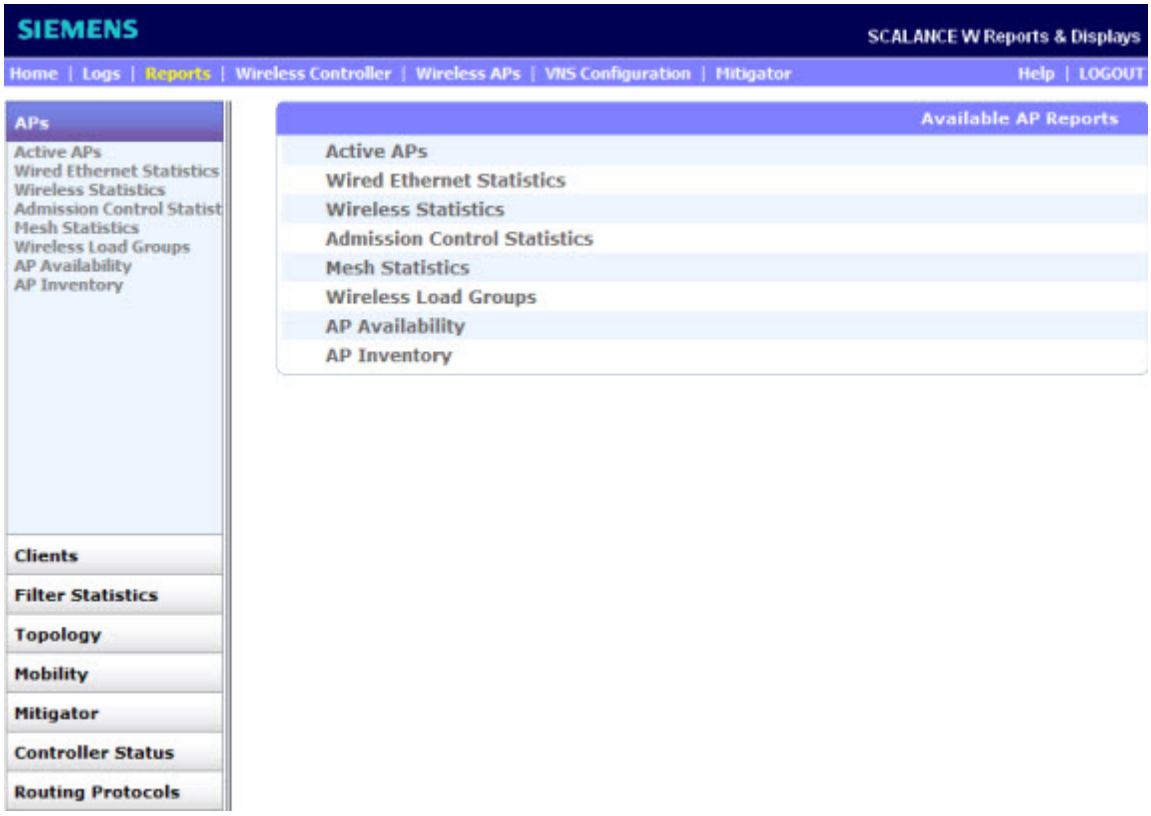
The following reports and statistics are available:

- AP Reports
- Active Clients Reports
- Filter Statistics Reports
- Topology Reports
- Mobility Reports
- Controller Status Reports
- Routing Protocols Reports

Viewing AP Reports and Statistics

To View AP Reports and Statistics:

1. From the top menu, click **Reports**. The **Available AP Reports** screen is displayed.



Viewing Statistics for APs

Several displays are snapshots of activity at that point in time on available APs:

- Active APs
- Wired Ethernet Statistics
- Wireless Statistics
- Admission Control Statistics
- Mesh Statistics
- Wireless Load Groups
- AP Availability
- AP Inventory

The statistics displayed are those defined in the 802.11 MIB, in the IEEE 802.11 standard.

The following Available Active Clients Reports allow you to search for clients, either by user name, MAC address, or IP address that are associated to the Wireless APs.

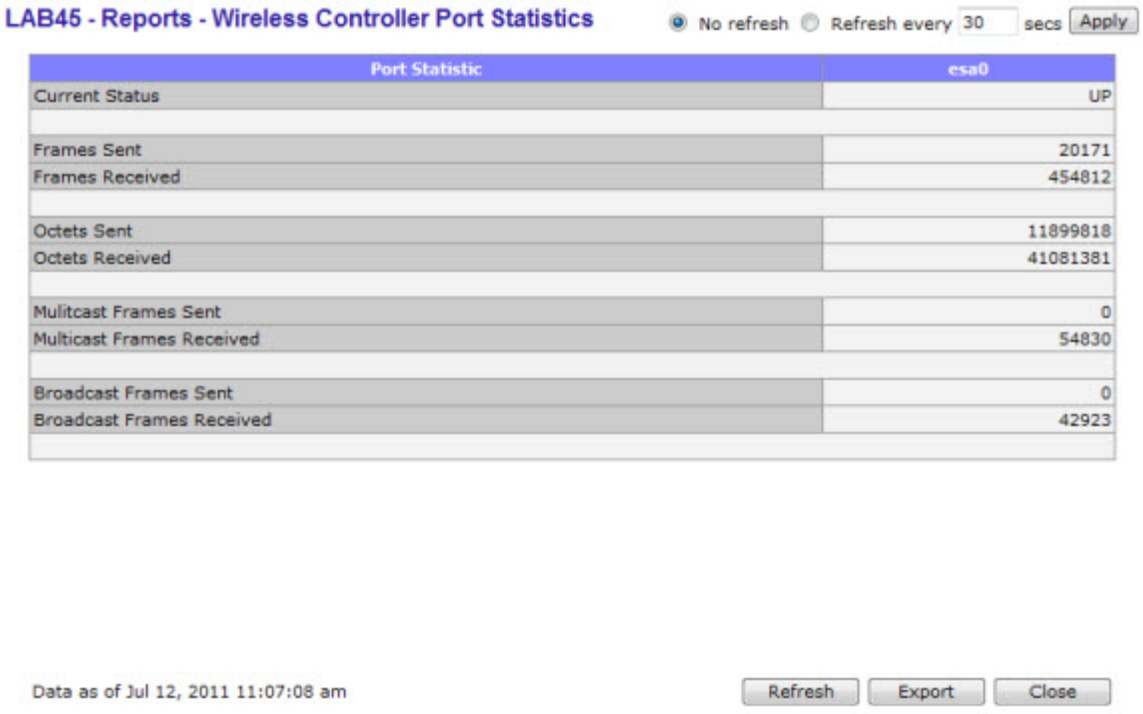
- Active Clients by AP

- Active Clients by VNS
- All Active Clients

You can also use the **Select All** and **Deselect All** buttons for selecting the active Wireless APs on those displays.

To View Active Wireless APs

1. From the top menu, click **Reports**. The **Available AP Reports** screen is displayed.
2. Click the **Active APs** display option. The **Active Wireless APs** display opens in a new browser window.

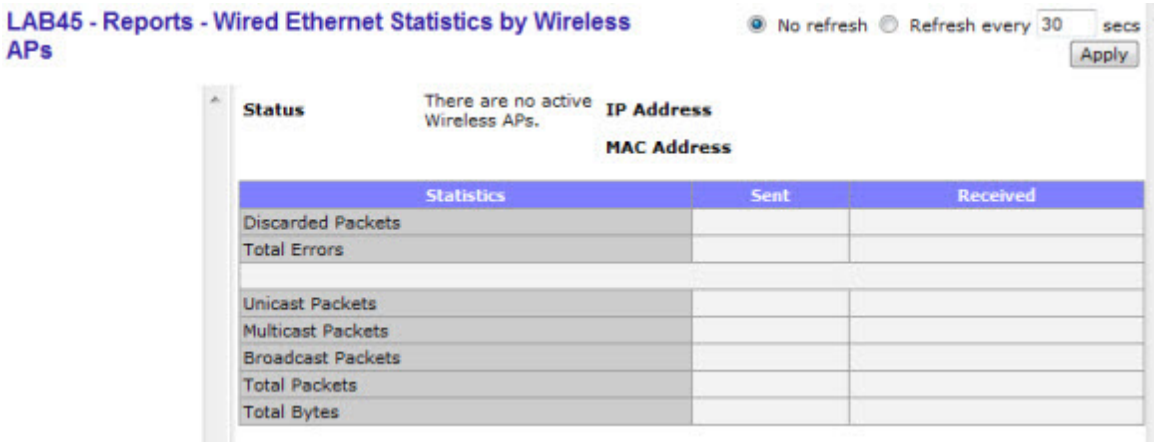


Note: Statistics are expressed in respect to the AP. Therefore, **Packets Sent** indicates the packets the AP has sent to a client and **Packets Rec'd** indicates the packets the AP has received from a client.

To View Wired Ethernet Statistics:

1. From the top menu, click **Reports**. The **Available AP Reports** screen is displayed.

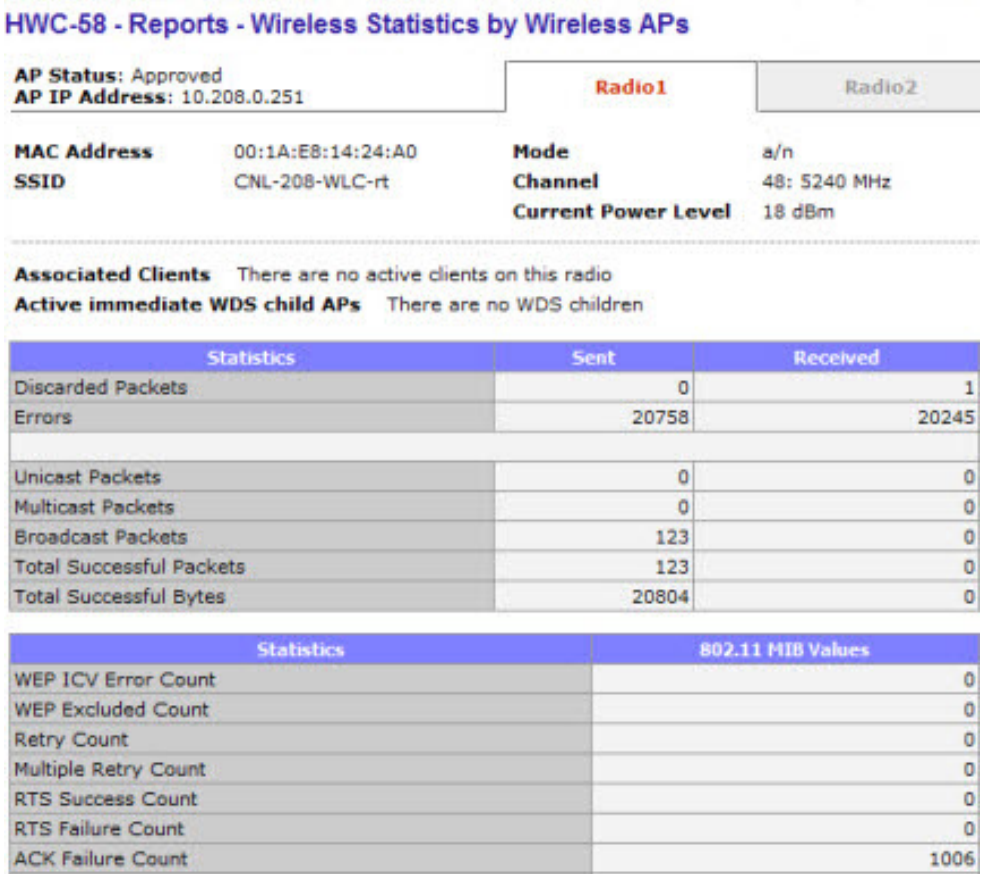
2. Click the **Wired Ethernet Statistics** display option. The **Wired Ethernet Statistics by Wireless APs** display opens in a new browser window.



3. In the **Wired Ethernet Statistics by** Wireless APs display, click a registered Wireless AP to display its information.

To View Wireless Statistics:

1. From the top menu, click **Reports**. The **Available AP Reports** screen is displayed.
2. Click the **Wireless Statistics** display option. The **Wireless Statistics by Wireless APs** display opens in a new browser window.



3. In the **Wireless Statistics by Wireless APs** display, click a registered Wireless AP to display its information.
4. Click the appropriate tab to display information for each Radio on the Wireless AP

To View Admission Control Statistics by Wireless AP:

1. From the top menu, click **Reports**. The **Available AP Reports** screen is displayed.
2. Click the **Admission Control Statistics** display option. The **Admission Control Statistics by Wireless AP** display opens in a new browser window.

3. In the **Admission Control Statistics by Wireless AP** display, click a registered Wireless AP to display its information:
4. The Admission Control Statistics by Wireless AP lists the TSPEC statistics associated with this Wireless AP:
   - **AC** — Access class where TSPEC is applied,
   - **Direction** — Uplink, Downlink or Bidirectional,
   - **MDR** — Mean Data Rate
   - **NMS** — Nominal Packet Size
   - **SBA** — Surplus Bandwidth (ratio)

   The following statistics are of measured traffic:
   - **Rate** — Rate in 30 second intervals (uplink and downlink)
   - **Violation** — Number of bits in excess in the last 30 seconds (uplink and downlink)

To View Mesh VNS Wireless AP Statistics:

1. From the top menu, click **Reports**. The **Available AP Reports** screen is displayed.

2. From the Available AP Reports screen, click **Mesh Statistics**. The **Mesh Statistics** display opens in a new browser window.

WLC - Reports - Mesh Statistics

AP Name	SSID	Rx Rss	Hops	Rx/Tx Rate
AP6 - AP3610-1 Internal[MP]	n/a	n/a	0	n/a
AP5 - Wireless AP3620-1 External[MP]	n/a	n/a	0	n/a

Data as of Aug 17, 2011 12:03:15 pm

Note:
The **Rx RSS** value on the **Mesh Statistics** display represents the received signal strength (in dBm).

Viewing Load Balance Group Statistics

The **Active Wireless Load Groups** report lists all load groups, and for the selected load group, all active AP radios.

To View the Active Wireless Load Groups Report:

1. From the top menu, click **Reports**. The **Available AP Reports** screen is displayed.
2. Click the **Wireless Load Groups** report.

   The **Active Wireless Load Groups** report opens in a new browser window. Reports display differently when reporting on client balance load groups and radio preference load groups.

WLC_Client_Balancing

Members
Clients
Average Load

AP	Radio	Load	State
AP6 - AP3610-1 Internal	1	0	Under-Loaded
AP6 - AP3610-1 Internal	2	0	Under-Loaded
Members: 2 Clients: 0 Average Load: 0.0			

.Viewing Wireless AP Availability

In session availability, the Wireless Availability report displays the state of both the tunnels — active tunnel and backup tunnel — on both the primary and secondary SCALANCE IWLAN Controllers.

The report uses the **Color Legend** to indicate the tunnel state:

- **Green** — Wireless AP has established an active tunnel.
- **Blue** — Wireless AP has established a backup tunnel.
- **Red** — Wireless AP is not connected.

In the report, each Wireless AP is represented by a box.

- The label, **Foreign** or **Local**, indicates whether the Wireless AP is local or foreign on the SCALANCE IWLAN Controller.
- The color in the upper pane of the box represents the state of the tunnel that is established to the current SCALANCE IWLAN Controller.

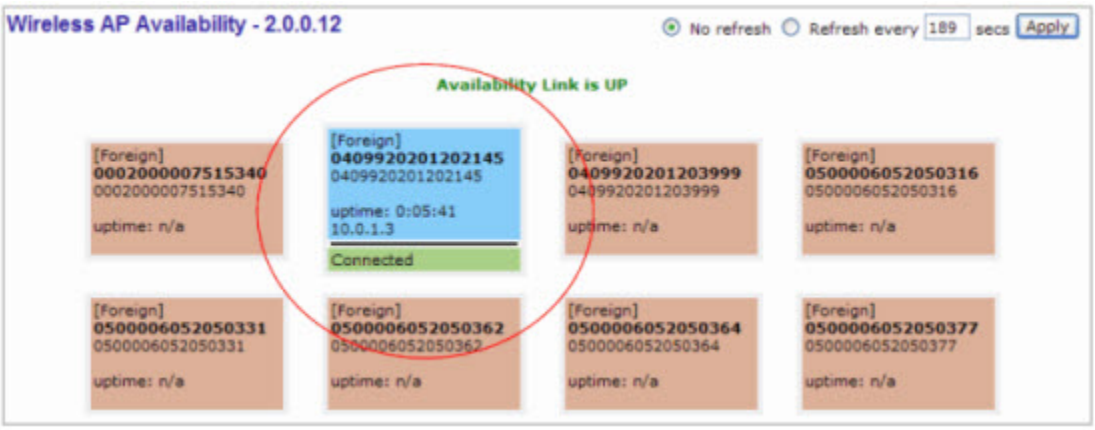
Note:
The current SCALANCE IWLAN Controller is the one on which the Wireless AP Availability report is viewed.

- The color in the lower pane of the box represents the state of the tunnel that is established with the other SCALANCE IWLAN Controller.

For the ease of understanding, take the example of the following scenario:

- Controller1 and Controller2 are paired in session availability
- A Wireless AP has established an active tunnel to Controller1.
- The same Wireless AP has established a backup tunnel to Controller2.

If you open the Wireless AP Availability report on Controller2, the report will appear as follows:



In the above example, the circled Wireless AP has established a backup tunnel to the foreign (secondary) SCALANCE IWLAN Controller, and an active tunnel to the local (Primary) SCALANCE IWLAN Controller.

AP Inventory Reports

To View Reports:

1. From the top menu, click **Reports**. The **Available AP Reports** screen is displayed.
2. In the **Available AP Reports** list, click the report you want to view.

Note:
The **AP Inventory** report opens in a new browser window. All other reports appear in the current browser window.

Note:
If you open only automatically refreshed reports, the Web management session timer will not be updated or reset. Your session will eventually time out.

The following is an example of the Wireless AP Inventory report:

WLC - Reports - Wireless AP Inventory

Wireless AP (Serial)	Topology				HW						SW	Country	Antennas		
	Rdo	Ra	Rb	Rg	Rn	DP	BP	RT	FT	Req Ch	Ch / Tx	Aj	TxMn	TxMx	Dom
	11n Channel Width							11n Guard Interval					11n Channel Bonding		
	Failure Maintn.							Assn		IP Address			Netmask		
0002000000051503 (0002000000051503)	PHY1				A&D Scalance W788-2RR						08.01.01.0198T	United States	-		
	1	on	-	-	off	5	100	2346	2346	auto	-	-	0 dB	18 dB	MyDomain
	-							-			-		-		
	2	-	on	on	off	5	100	2346	2346	auto	-	-	8 dB	18 dB	MyDomain
	-							-			-		-		
	enabled							DHCP		10.45.0.51			255.255.255.0		
0002000009051270 (0002000009051270)					A&D Scalance W788-2RR						08.01.01.0208	United States	-		
	1	on	-	-	off	5	100	2346	2346	auto	-	-	0 dB	18 dB	MyDomain
	-							-			-		-		
	2	-	on	on	off	5	100	2346	2346	auto	-	-	8 dB	18 dB	MyDomain
	-							-			-		-		
	enabled							DHCP		0.0.0.0			0.0.0.0		
1111111111111111 (1111111111111111)					W786C-2-RJ45						08.01.01.0208	United States	left-1: No Antenna middle-1: No Antenna right-1: No Antenna left-2: No Antenna middle-2: No Antenna right-2: No Antenna		
	1	on	-	-	on	5	100	2346	2346	auto	-	-	0 dB	18 dB	MyDomain
	40MHz							Short							
	2	-	on	on	off	5	100	2346	2346	auto	-	-	8 dB	18 dB	MyDomain
	20MHz							-							
	enabled							DHCP		0.0.0.0			0.0.0.0		

Table 16-1 lists the column names and abbreviations found in the **AP Inventory** report:

Table 16-1 AP Inventory Report Columns

Column Name	Description
Topology	Ethernet port and associated IP address of the interface on the SCALANCE IWLAN Controller through which the Wireless AP communicates.
HW	Hardware version of the Wireless AP.
SW	Software version executing on the Wireless AP.
Country	Country in which the AP is deployed
Antennas	Antennas used
Telnet/SSH	Telnet or SSH access (enabled or disabled)
LBS	Location-based service (enabled or disabled)
BD	Broadcast disassociation (enabled or disabled).
Persistence	Enabled or disabled
P/To	Poll timeout. If polling is enabled, a numeric value.
P/I	Poll interval. If polling is enabled, a numeric value.
Wired MAC	The physical address of the Wireless AP's wired Ethernet interface.
Description	As defined on the **AP Properties** screen.
Rdo	Radios: **1** or **2**.

Table 16-1 AP Inventory Report Columns (continued)

Column Name	Description
Ra	802.11a radio. The data entry for an Wireless AP indicates whether the **a** radio is on or off.
Rb	802.11b protocol enabled. Possible values are **on** or **off**.
Rg	802.11g protocol enabled. Possible values are **on** or **off**.
Rn	802.11n protocol enabled. Possible values are **on** or **off**.
DP	DTIM period
BP	Beacon Period
RT	RTS Threshold
FT	Fragmentation Threshold
Req Ch	Channel served by the corresponding radio.
Ch / Tx	Channel Tx
Aj	Tx power level, in decibels
TxMn	Minimum Tx power, in decibels
TxMx	Maximum Tx power, in decibels
Dom	RF domain
MnBR	Minimum Basic Rate (For more information, see the Wireless AP radio configuration tabs.)
MxBR	Maximum Basic Rate
MxOR	Maximum Operational Rate
RxDV	Receive Diversity
TxDV	Tx Diversity
Pmb	Preamble (long, short)
PM	Protection Mode
PR	Protection Rate
PT	Protection Type
VNS Name: MAC	Also called BSSID, this is the MAC address of a (virtual) wireless interface on which the Wireless AP serves a BSS/VNS. There could be 8 per radio.
11n Channel Width	20MHz, 40MHz, or auto
11n Guard Interval	If 11n Channel Width is 40MHz, long or short
11n Channel Bonding	Enabled only if 11n Channel Width is 40MHz
11n Protection Mode	Protects high throughput transmissions on primary channels from non-11n APs and clients. Enabled or disabled.
Failure Maintn.	Maintain MU sessions on Wireless AP when the Wireless AP loses the connection to the SCALANCE IWLAN Controller.
Assn	Assignment (address assignment method)

Table 16-1 AP Inventory Report Columns (continued)

Column Name	Description
IP Address	Wireless AP's IP address if statically configured (same as the **Static Values** radio button on the **AP Static Configuration** screen).
Netmask	If the Wireless AP's IP address is configured statically, the net mask that is statically configured for the Wireless AP.
Gateway	If the Wireless AP's IP address is configured statically, the IP address of the gateway router that the Wireless AP will use.
TLS	802.1x EAP-TLS authentication configuration
PEAP	802.1x PEAP authentication configuration
WLC Search List	The list of IP addresses that the Wireless AP is configured to try to connect to in the event that the current connection to the SCALANCE IWLAN Controller is lost.

About Radio Preference/Load Control Statistics

The statistics reported for each radio preference load balance group are:

- **Members** — The number of AP members

The statistics reported for each member of the load balance group are:

- **AP** — AP name
- **Band Preference**
  - **Status** —The operational status: enabled or disabled
  - **Probes Declined** —The number of probes declined
  - **Auth/Assoc Requests Declined** —The number of authentications or associations declined
- **Load Control**
  - **Radio 1**
    - **Status** —The operational status: enabled or disable
    - **Rejected** —The number of clients declined at the first association attempt
  - **Radio 2**
    - **Status** —The operational status: enabled or disabled
    - **Rejected** —The number of clients declined at the first association attempt
    - **Returned** —The number of clients declined at the second association attempt

Load balance group statistics are reported on the foreign controller when APs fail over with load groups from a different controller indicated with an "(F)" following the load group name.

About Client Balancing Statistics Reports

In a client balancing/load control statistics report, the statistics reported for each client balancing load balance group are:

- **Members** — Number of radio members
- **Clients** — Total number of clients for all radio members
- **Average Load** — Average load for the group

  The reported average load may not be correct in a failover situation. If some APs in the load balance group fail over the foreign controller, those APs will report to the foreign controller. The member APs will continue to use the member count for the whole group, but the member count displayed on the controller will be for only those APs that are reporting. Since the member count reported on the controller is not the complete set, the average will not be consistent with what the APs are using for the state determination.

The statistics reported for each member of the load balance group are:

- **AP** — AP name
- **Radio** — Radio number
- **Load** — Load value (number of clients currently associated with the AP)
- **State** — Load state
- **Probes Declined**
- **Auth/Assoc Requests Declined**
- **Rebalance Event** — Clients removed because of an over-loaded state

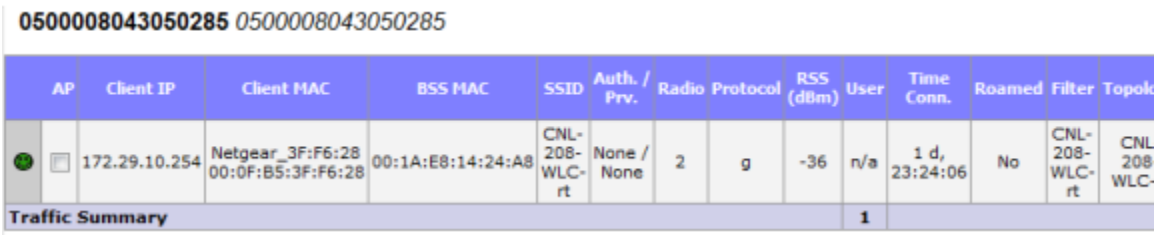
The report identifies SIAPP sub-groupings and provide separate group statistics for each sub-group.

When the load group includes sub-groups, **Average Load**, in red, is the average of the entire group. The average for each sub-group is also reported. The sub-group average is reported in red when group membership changes and not all members have been updated with the new member count.

Load balance group statistics are reported on the foreign controller when APs fail over with load groups from a different controller indicated with an "(F)" following the load group name.

Viewing Active Clients

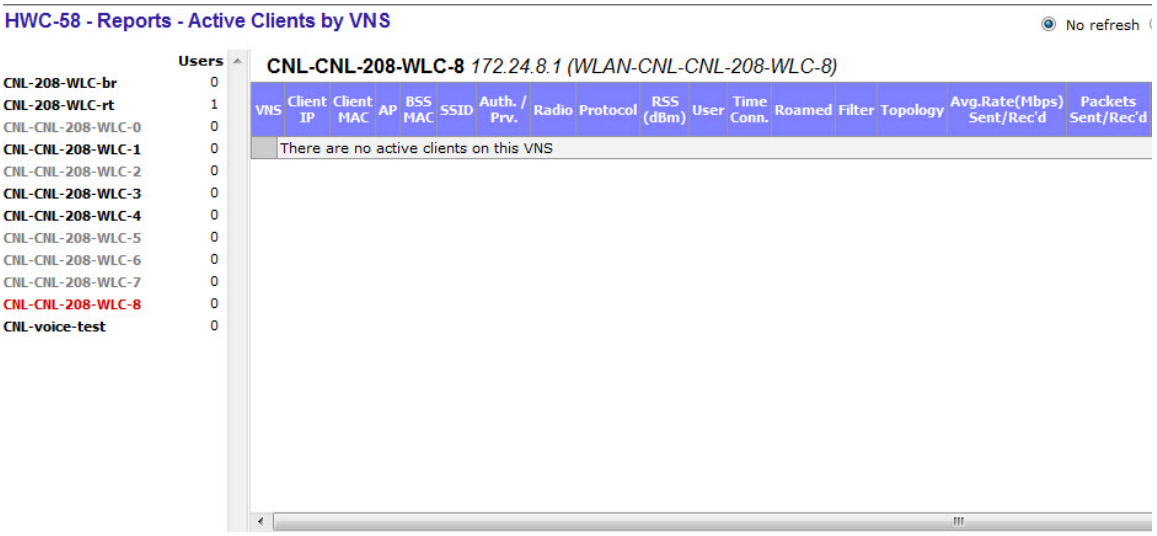
1. From the top menu, click **Reports**. The **Available AP Reports** screen is displayed.
2. In the left pane, click **Clients.**
3. Under Available Active Clients Reports, click **By AP**. The **Active Clients by Wireless APs** display opens in a new browser window.



0500008043050285 *0500008043050285*

	AP	Client IP	Client MAC	BSS MAC	SSID	Auth. / Prv.	Radio	Protocol	RSS (dBm)	User	Time Conn.	Roamed	Filter	Topol
		172.29.10.254	Netgear_3F:F6:28 00:0F:B5:3F:F6:28	00:1A:E8:14:24:A8	CNL-208-WLC-rt	None / None	2	g	-36	n/a	1 d, 23:24:06	No	CNL-208-WLC-rt	CNL 208 WLC-
Traffic Summary										**1**				

   - The green circle icon in the first column indicates that the client is authenticated.
   - The **RSS** (received signal strength) of a client is the average of the transmitted and received RSS on hardware platforms where both values are available.
4. Under Available Active Clients Reports, click **By VNS**. The **Active Clients by VNS** display opens in a new browser window.



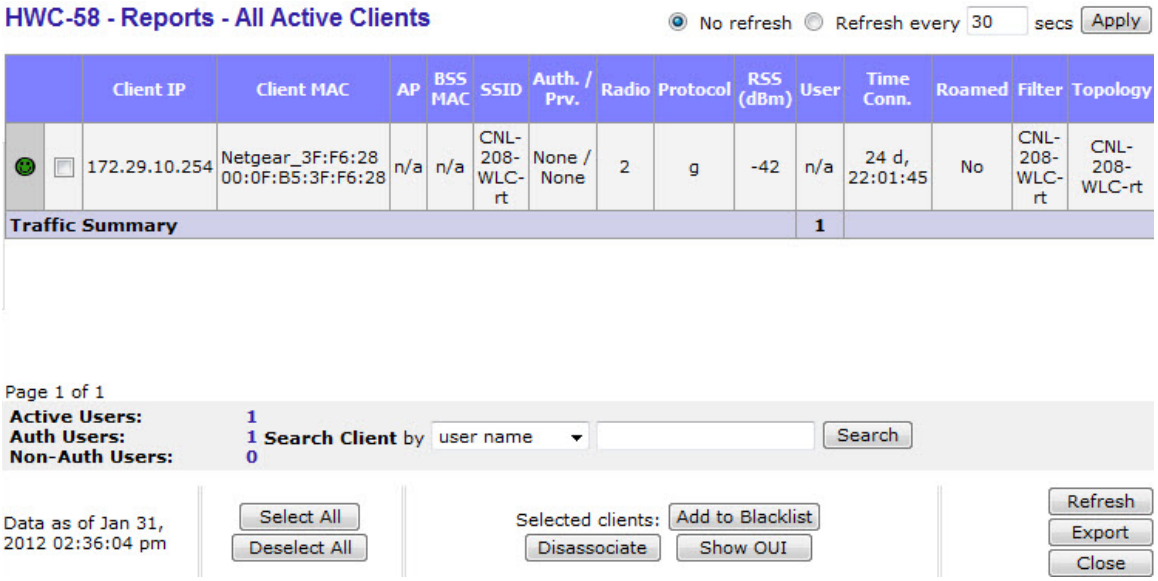
HWC-58 - Reports - Active Clients by VNS — No refresh

	Users
CNL-208-WLC-br	0
CNL-208-WLC-rt	1
CNL-CNL-208-WLC-0	0
CNL-CNL-208-WLC-1	0
CNL-CNL-208-WLC-2	0
CNL-CNL-208-WLC-3	0
CNL-CNL-208-WLC-4	0
CNL-CNL-208-WLC-5	0
CNL-CNL-208-WLC-6	0
CNL-CNL-208-WLC-7	0
CNL-CNL-208-WLC-8	0
CNL-voice-test	0

CNL-CNL-208-WLC-8 *172.24.8.1 (WLAN-CNL-CNL-208-WLC-8)*

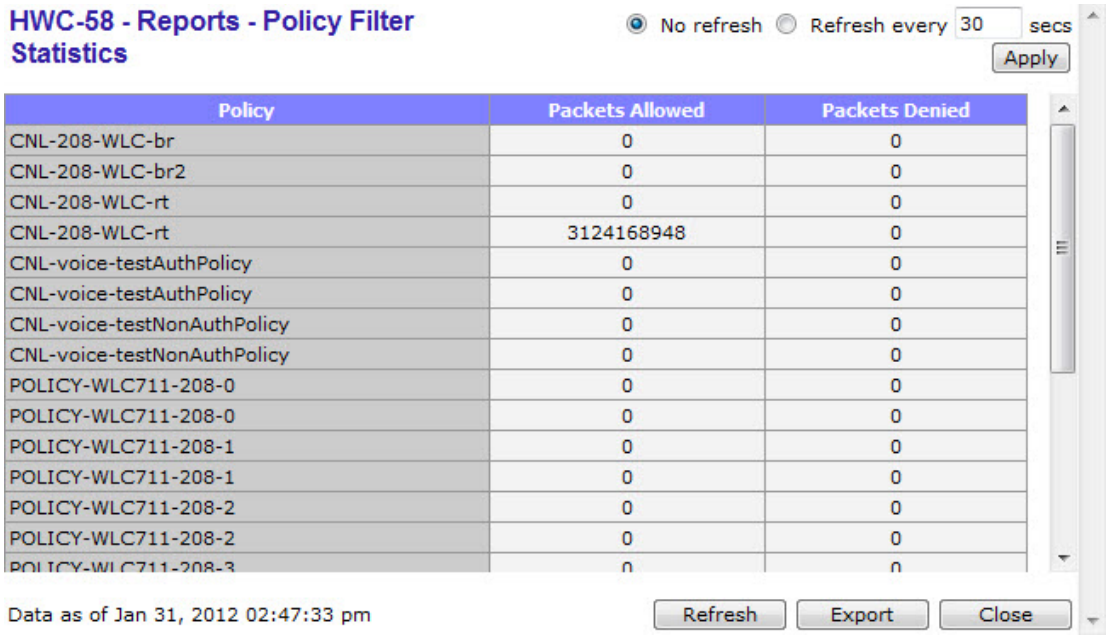
VNS	Client IP	Client MAC	AP	BSS MAC	SSID	Auth. / Prv.	Radio	Protocol	RSS (dBm)	User	Time Conn.	Roamed	Filter	Topology	Avg.Rate(Mbps) Sent/Rec'd	Packets Sent/Rec'd
There are no active clients on this VNS																

5. Under Available Active Clients Reports, click **All Active Clients**. The **All Active Clients** display opens in a new browser window.



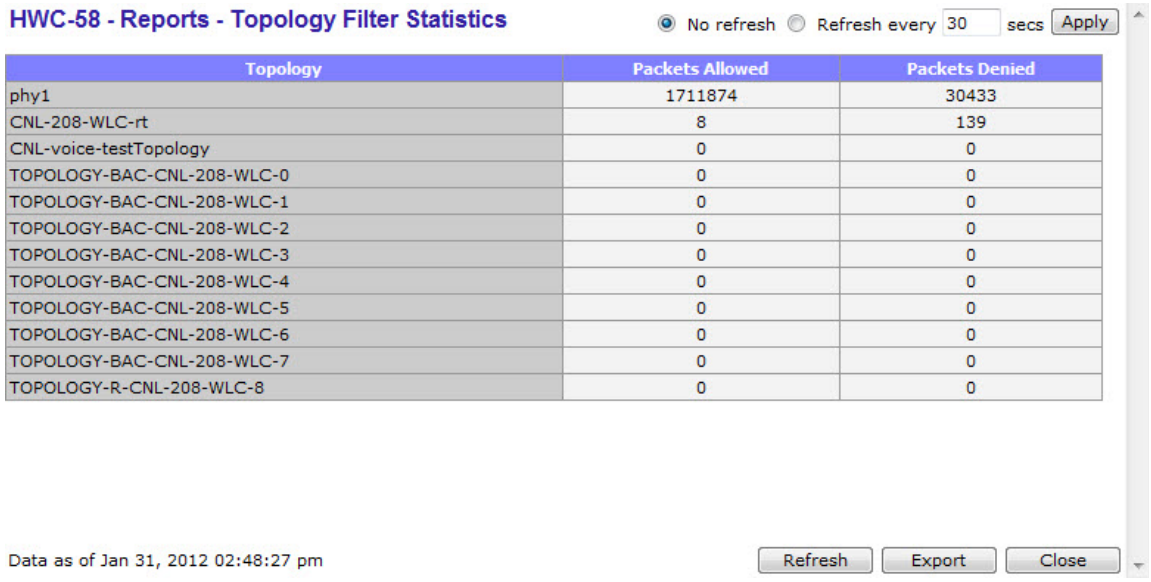
Viewing Policy Filter Statistics

1. From the top menu, click **Reports**. The **Available AP Reports** screen is displayed.
2. In the left pane, click **Filter Statistics.**
3. Under Available Filter Statistics Reports, click **Policy Filter Statistics**. The **Policy Filter Statistics** display opens in a new browser window.



- Statistics are expressed in respect to the AP. Therefore, **Packets Allowed** indicates the packets the AP has received from a client and **Packets Denied** indicates the packets the AP has rejected.
- A client is displayed as soon as the client connects (or after a refresh of the screen). The client disappears as soon as it times out.

4. Under Available Filter Statistics Reports, click **Topology Filter Statistics**. The **Topology Filter Statistics** display opens in a new browser window.



- Statistics are expressed in respect to the AP. Therefore, **Packets Allowed** indicates the packets the AP has received from a client and **Packets Denied** indicates the packets the AP has rejected.
- A client is displayed as soon as the client connects (or after a refresh of the screen). The client disappears as soon as it times out.

Viewing Topology Statistics

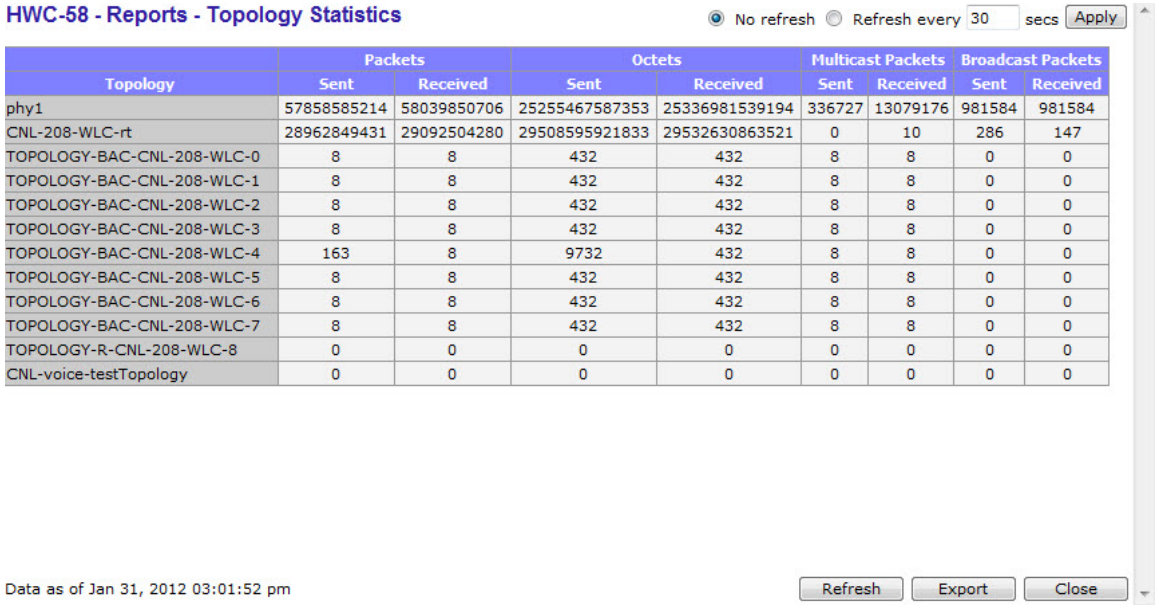
Topology Statistics — Displays statistics for total sent and received packets, octects, multicast packets, and broadcast packets.

RADIUS Statistics — Displays the total number of requests for each VNS including failed and rejected attempts.

WLC Reports — Displays port statistics for active Topologies including current status and totals for frames, octects, multicast frames and broadcast frames sent and received.

1. From the top menu, click **Reports**. The **Available AP Reports** screen is displayed.
2. In the left pane, click **Topology.**

3. Under Available Topology Reports, click **Topology Statistics**. The **Topology Statistics** display opens in a new browser window.



HWC-58 - Reports - Topology Statistics

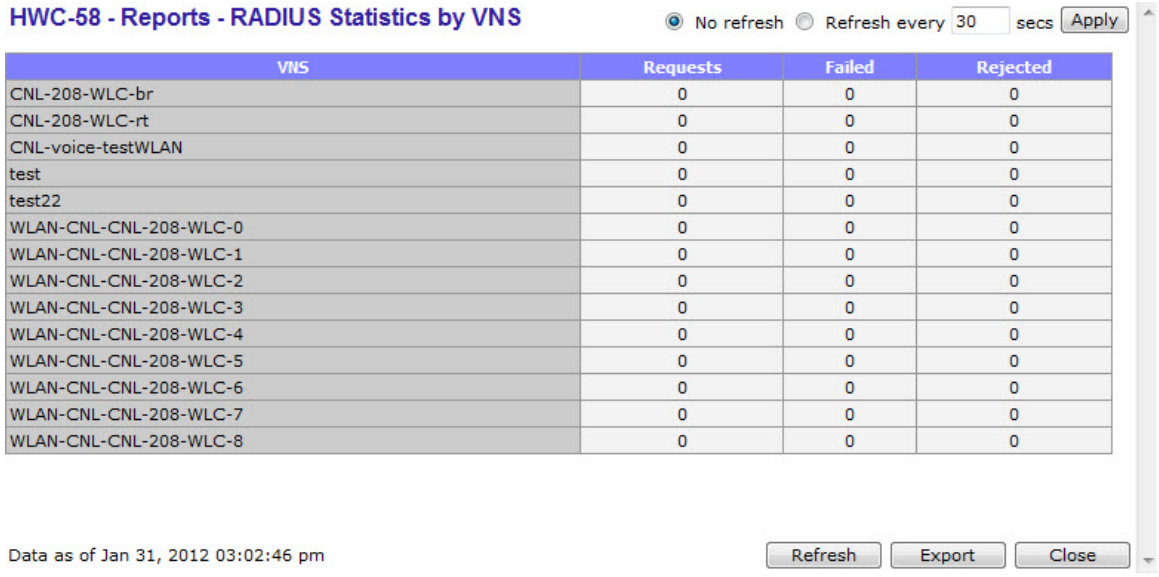
No refresh | Refresh every 30 secs | Apply

Topology	Packets		Octets		Multicast Packets		Broadcast Packets	
	Sent	Received	Sent	Received	Sent	Received	Sent	Received
phy1	57858585214	58039850706	25255467587353	25336981539194	336727	13079176	981584	981584
CNL-208-WLC-rt	28962849431	29092504280	29508595921833	29532630863521	0	10	286	147
TOPOLOGY-BAC-CNL-208-WLC-0	8	8	432	432	8	8	0	0
TOPOLOGY-BAC-CNL-208-WLC-1	8	8	432	432	8	8	0	0
TOPOLOGY-BAC-CNL-208-WLC-2	8	8	432	432	8	8	0	0
TOPOLOGY-BAC-CNL-208-WLC-3	8	8	432	432	8	8	0	0
TOPOLOGY-BAC-CNL-208-WLC-4	163	8	9732	432	8	8	0	0
TOPOLOGY-BAC-CNL-208-WLC-5	8	8	432	432	8	8	0	0
TOPOLOGY-BAC-CNL-208-WLC-6	8	8	432	432	8	8	0	0
TOPOLOGY-BAC-CNL-208-WLC-7	8	8	432	432	8	8	0	0
TOPOLOGY-R-CNL-208-WLC-8	0	0	0	0	0	0	0	0
CNL-voice-testTopology	0	0	0	0	0	0	0	0

Data as of Jan 31, 2012 03:01:52 pm

Refresh | Export | Close

4. Under Available Topology Reports, click **RADIUS Statistics**. The **RADIUS Statistics** display opens in a new browser window.



HWC-58 - Reports - RADIUS Statistics by VNS

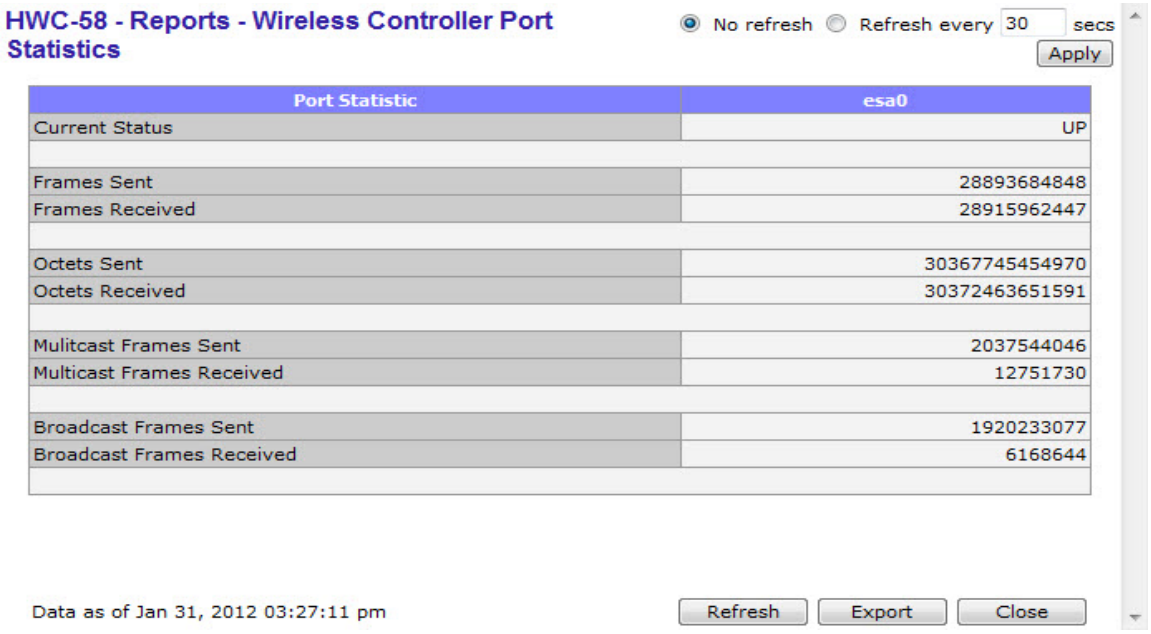
No refresh | Refresh every 30 secs | Apply

VNS	Requests	Failed	Rejected
CNL-208-WLC-br	0	0	0
CNL-208-WLC-rt	0	0	0
CNL-voice-testWLAN	0	0	0
test	0	0	0
test22	0	0	0
WLAN-CNL-CNL-208-WLC-0	0	0	0
WLAN-CNL-CNL-208-WLC-1	0	0	0
WLAN-CNL-CNL-208-WLC-2	0	0	0
WLAN-CNL-CNL-208-WLC-3	0	0	0
WLAN-CNL-CNL-208-WLC-4	0	0	0
WLAN-CNL-CNL-208-WLC-5	0	0	0
WLAN-CNL-CNL-208-WLC-6	0	0	0
WLAN-CNL-CNL-208-WLC-7	0	0	0
WLAN-CNL-CNL-208-WLC-8	0	0	0

Data as of Jan 31, 2012 03:02:46 pm

Refresh | Export | Close

5. Under Available Topology Reports, click **WLC Port Statistics**. The **WLC Port Statistics** display opens in a new browser window.



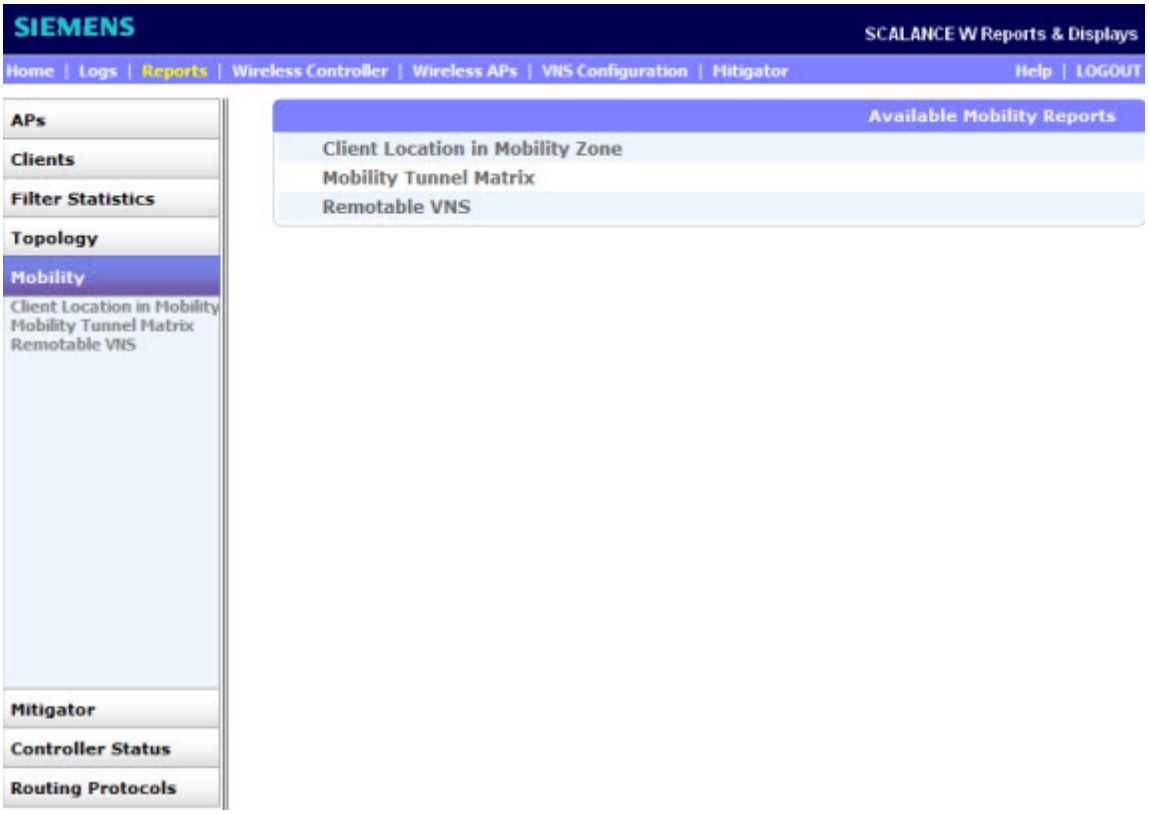
   – Statistics are expressed in respect to the AP. Therefore, **Frames Sent** indicates packets sent to the AP from a client and **Frames Received** indicates the packets received from the AP.

Viewing Mobility Reports

When a SCALANCE IWLAN Controller has been configured as a mobility manager, two additional displays appear as options in the left pane:

- **Client Location in Mobility Zone** — Displays the active wireless clients and their status
- **Mobility Tunnel Matrix** — Displays a cross-connection view of the state of inter-controller tunnels, as well as relative loading for user distribution across the mobility domain
- **Remotable VNS** — Displays the active remotable VNSs and their status

Note: The **Client Location in Mobility Zone** and **Mobility Tunnel Matrix** displays only appear if the mobility manager function has been enabled for the controller. Otherwise, the **Agent Mobility Tunnel Matrix** display is listed.



To View Mobility Manager Displays:

1. From the top menu, click **Reports**. The **Available AP Reports** screen is displayed.
2. In the left pane, click **Mobility.**
3. Click the appropriate mobility manager display:
   - Client Location in Mobility Zone
   - Mobility Tunnel Matrix
   - Remotable VNS

The colored status indicates the following:

- **Green** — The mobility manager is in communication with an agent and the data tunnel has been successfully established.
- **Yellow** — The mobility manager is in communication with an agent but the data tunnel is not yet successfully established.
- **Red** — The mobility manager is not in communication with an agent and there is no data tunnel.

Client Location in Mobility Zone

You can do the following:

- Sort this display by home or foreign controller
- Search for a client by MAC address, user name, or IP address, and typing the search criteria in the box
- Define the refresh rates for this display
- Export this information as an xml file

Mobility Tunnel Matrix

- Provides connectivity matrix of mobility state
- Provides a view of:
  - Tunnel state
  - If a tunnel between controllers is reported down, it is highlighted in red
  - If only a control tunnel is present, it is highlighted in yellow
  - If data and control tunnels are fully established, it is highlighted in green
  - Tunnel Uptime
  - Number of clients roamed (Mobility loading)
  - Local controller loading
  - Mobility membership list

A SCALANCE IWLAN Controller is only removed from the mobility matrix if it is explicitly removed by the administrator from the Mobility permission list. If a particular link between controllers, or the controller is down, the corresponding matrix connections are identified in red color to identify the link.

The Active Clients by VNS report for the controller on which the user is home (home controller) will display the known user characteristics (IP, statistics, etc.). On the foreign controller, the Clients by VNS report does not show users that have roamed from other controllers, since the users remain associated with the home controller's VNS.

The Active Clients by AP report on each controller will show both the loading of local and foreign users (users roamed from other controllers) that are taking resources on the AP.

Note:
Although you can set the screen refresh period less than 30 seconds, the screen will not be refreshed quicker than 30 seconds. The screen will be refreshed according to the value you set only if you set the value above 30 seconds.

Remotable VNS

You can do the following:

- Sort this display by home or foreign controller
- Search for a client by MAC address, user name, or IP address, and typing the search criteria in the box
- Define the refresh rates for this display
- Export this information as an xml file.

Viewing Controller Status Information

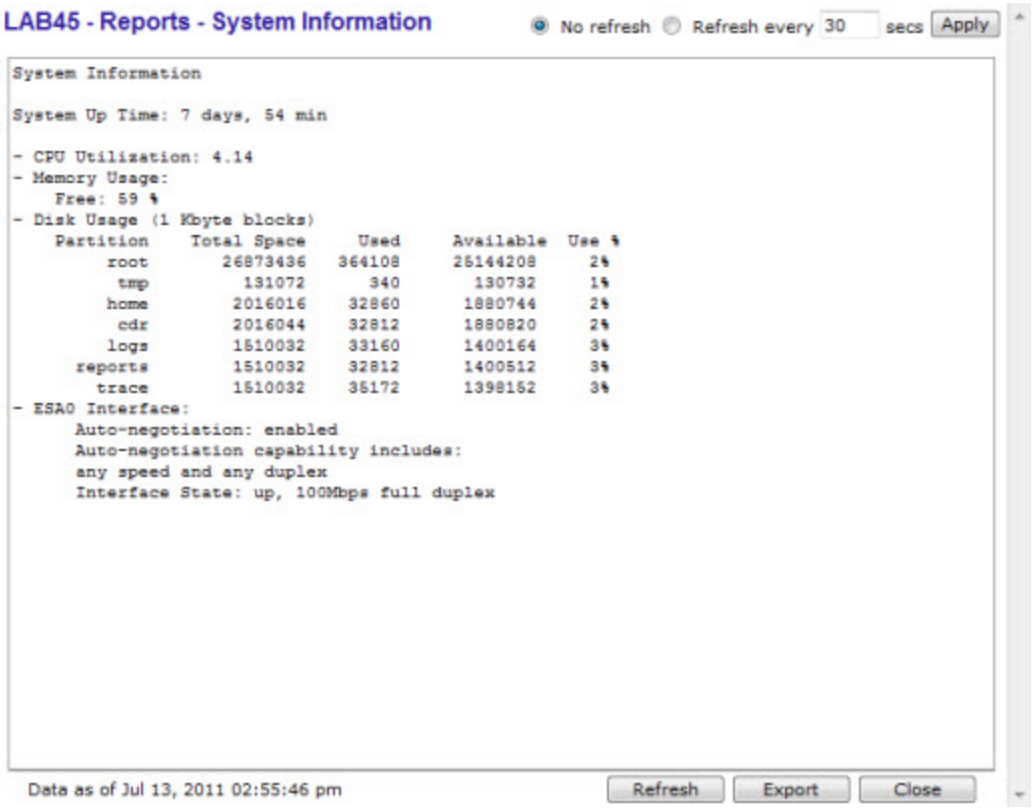
External Connection Statistics— Displays connection information including security level.

System Information — Displays system information including memory usage and CPU and board temperatures.

Manufacturing Information — Displays manufacturing information including the card serial number and CPU type and frequency.

To View System Information:

1. From the top menu, click **Reports**. The **Available AP Reports** screen is displayed.
2. In the left pane, click **Controller Status.** The **Available Controller Status Reports** screen is displayed.
3. Click the **System Information** display option. The **System Information** display opens in a new browser window.


LAB45 - Reports - System Information
No refresh
Refresh every 30 secs
Apply
System Information
System Up Time: 7 days, 54 min
- CPU Utilization: 4.14
- Memory Usage:
Free: 59 %
- Disk Usage (1 Kbyte blocks)
Partition Total Space Used Available Use %
root 26873436 364108 25144208 2%
tmp 131072 340 130732 1%
home 2016016 32860 1880744 2%
cdr 2016044 32812 1880820 2%
logs 1510032 33160 1400164 3%
reports 1510032 32812 1400512 3%
trace 1510032 35172 1398152 3%
- ESA0 Interface:
Auto-negotiation: enabled
Auto-negotiation capability includes:
any speed and any duplex
Interface State: up, 100Mbps full duplex
Data as of Jul 13, 2011 02:55:46 pm
Refresh
Export
Close

To View Manufacturing Information:

1. From the top menu, click **Reports**. The **Available AP Reports** screen is displayed.
2. In the left pane, click **Controller Status.** The **Available Controller Status Reports** screen is displayed.

3. Click the **Manufacturing Information** display option. The **Manufacturing Information** display opens in a new browser window.

LAB45 - Reports - Manufacturing Information
Manufacturing Information
Manufacturing ID (Serial Number): B4858436
BIOS Version: V12.01.03
Hardware Revision: ES003
Software Version: 08.01.01.0172
Model: WLC711
CPU Type: Intel(R) Core(TM)2 Duo CPU U9300 @ 1.20GHz
CPU Frequency (MHz): 1197.162
LAN MAC address: 00:0e:8c:eb:cd:cd
ADMIN MAC address: 00:0e:8c:eb:cd:ba

Viewing Routing Protocol Reports

The following reports are available in the SCALANCE WLC711 system:

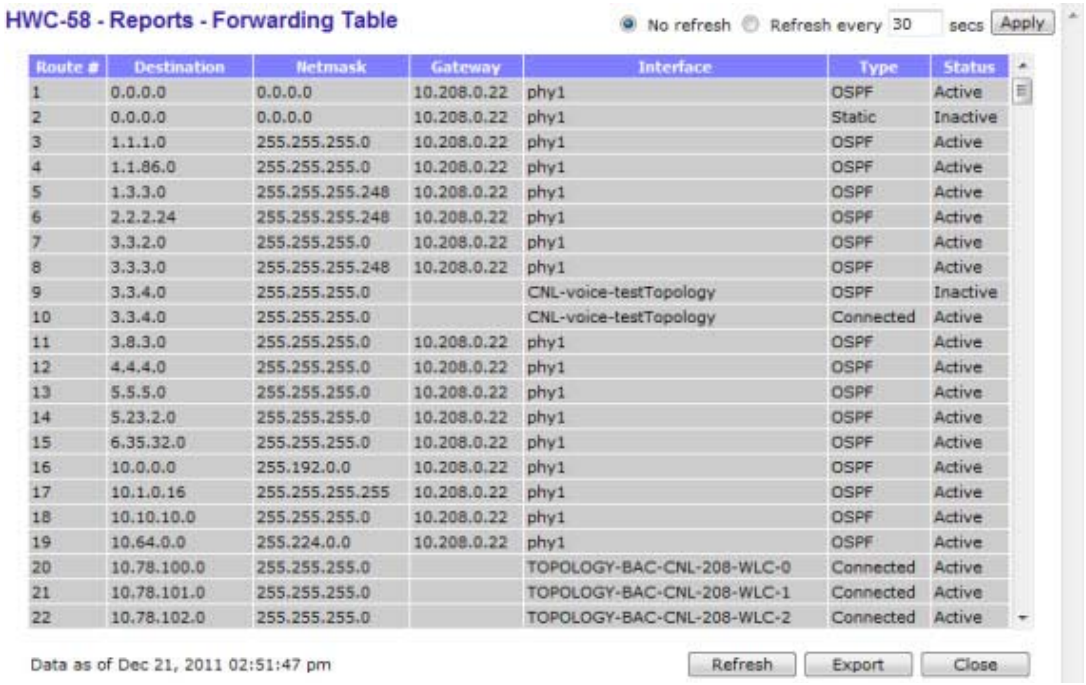
- **Forwarding Table** — Displays the defined routes, whether static or OSPF, and their current status.
- **OSPF Neighbor** — Displays the current neighbors for OSPF (routers that have interfaces to a common network).
- **OSPF Linkstate** — Displays the Link State Advertisements (LSAs) received by the currently running OSPF process. The LSAs describe the local state of a router or network, including the state of the router's interfaces and adjacencies.

To View Reports:

1. From the top menu, click **Reports**. The **Available AP Reports** screen is displayed.
2. In the left pane, click **Routing Protocols**.

3. Click the appropriate Routing Protocol Report:

The following is an example of a **Forwarding Table** report:



Route #	Destination	Netmask	Gateway	Interface	Type	Status
1	0.0.0.0	0.0.0.0	10.208.0.22	phy1	OSPF	Active
2	0.0.0.0	0.0.0.0	10.208.0.22	phy1	Static	Inactive
3	1.1.1.0	255.255.255.0	10.208.0.22	phy1	OSPF	Active
4	1.1.86.0	255.255.255.0	10.208.0.22	phy1	OSPF	Active
5	1.3.3.0	255.255.255.248	10.208.0.22	phy1	OSPF	Active
6	2.2.2.24	255.255.255.248	10.208.0.22	phy1	OSPF	Active
7	3.3.2.0	255.255.255.0	10.208.0.22	phy1	OSPF	Active
8	3.3.3.0	255.255.255.248	10.208.0.22	phy1	OSPF	Active
9	3.3.4.0	255.255.255.0		CNL-voice-testTopology	OSPF	Inactive
10	3.3.4.0	255.255.255.0		CNL-voice-testTopology	Connected	Active
11	3.8.3.0	255.255.255.0	10.208.0.22	phy1	OSPF	Active
12	4.4.4.0	255.255.255.0	10.208.0.22	phy1	OSPF	Active
13	5.5.5.0	255.255.255.0	10.208.0.22	phy1	OSPF	Active
14	5.23.2.0	255.255.255.0	10.208.0.22	phy1	OSPF	Active
15	6.35.32.0	255.255.255.0	10.208.0.22	phy1	OSPF	Active
16	10.0.0.0	255.192.0.0	10.208.0.22	phy1	OSPF	Active
17	10.1.0.16	255.255.255.255	10.208.0.22	phy1	OSPF	Active
18	10.10.10.0	255.255.255.0	10.208.0.22	phy1	OSPF	Active
19	10.64.0.0	255.224.0.0	10.208.0.22	phy1	OSPF	Active
20	10.78.100.0	255.255.255.0		TOPOLOGY-BAC-CNL-208-WLC-0	Connected	Active
21	10.78.101.0	255.255.255.0		TOPOLOGY-BAC-CNL-208-WLC-1	Connected	Active
22	10.78.102.0	255.255.255.0		TOPOLOGY-BAC-CNL-208-WLC-2	Connected	Active

Note:
If you open only automatically refreshed reports, the Web management session timer will not be updated or reset. Your session will eventually time out.

To Export and Save a Report in XML:

1. On the report screen, click **Export**. A Windows **File Download** dialog is displayed.
2. Click **Save**. A Windows **Save As** dialog is displayed.

Note:
If your default XML viewer is Internet Explorer or Netscape, clicking **Open** will open the exported data to your display screen. You must right-click to go back to the export display. The XML data file will not be saved to your local drive.

3. Browse to the location where you want to save the exported XML data file, and in the **File name** box enter an appropriate name for the file.
4. Click **Save**. The XML data file is saved in the specified location.

Call Detail Records (CDRs)

You can configure the SCALANCE IWLAN Controller to generate Call Detail Records (CDRs), which contain usage information about each wireless session per VNS. For more information on how to configure the SCALANCE IWLAN Controller to generate CDRs, refer to "Defining Accounting Methods for a WLAN Service" on page 6-15.

CDRs are located in a CDR directory on the SCALANCE IWLAN Controller. To access the CDR file, you must first back up the file on the local drive, and then upload it to a remote server. After

the CDR file is uploaded to a remote server, you can work with the file to view CDRs or import the records to a reporting tool.

You can back up and upload the file on the remote server either via the SCALANCE IWLAN Assistant (GUI) or CLI.

CDR File Naming Convention

CDRs are written to a file on the SCALANCE IWLAN Controller. The filename is based on the creation time of the CDR file with the following format: YYYYMMDDhhmmss.<ext>

- **YYYY** — Four digit year
- **MM** — Two digit month, padded with a leading zero if the month number is less than 10
- **DD** — Two digit day of the month, padded with a leading zero if the day number is less than 10
- **hh** — Two digit hour, padded with a leading zero if the hour number is less than 10
- **mm** — Two digit minute, padded with a leading zero if the minute number is less than 10
- **ss** — Two digit second, padded with a leading zero if the second number is less than 10
- **<ext>** — File extension, either **.work** or **.dat**

CDR File Types

Two types of CDR files exist in the CDR directory on the SCALANCE IWLAN Controller:

- **.work** — The active file that is being updated by the accounting system. The file is closed and renamed with the **.dat** extension when it attains its maximum size (16 MB) or it has been open for the maximum allowed duration (12 hours). You can back up and copy the **.work** file from the SCALANCE IWLAN Controller to a remote server.
- **.dat** — The inactive file that contains the archived account records. You can back up and copy the **.dat** file from the SCALANCE IWLAN Controller to a remote server.

Note:
The CDR directory on the SCALANCE IWLAN Controller only has two files — a **.work** file and a **.dat** file. When the **.work** file attains its maximum size of 16 MB, or it has been open for 12 hours, it is saved as a **.dat** file. This new **.dat** file overwrites the existing **.dat** file. If you want to copy the existing **.dat** file, you must do so before it is overwritten by the new **.dat** file.

CDR File Format

A CDR file contains a sequence of CDR records. The file is a standard ASCII text file. Records are separated by a sequence of dashes followed by a line break. The individual fields of a record are reported one per line, in “field=value’ format.

The following table describes the records that are displayed in a CDR file.

Note:
Most of the CDR records are typical RADIUS server attributes. For more information, refer to the user manual of your RADIUS server.

Table 16-2 CDR Records and Their Description

CDR Records	Description
Acct-Session-ID	A unique CDR ID
User-Name	The name of the user, who was authenticated.
Filter-ID	The name of the filter list for the user.
Acct-Interim-Interval	The number of seconds between interim accounting updates.
Session-Timeout	The maximum number of seconds of service to be provided to the user before termination of the session.
Class	This field is copied from the access-accept message sent by the RADIUS server during authentication.
Acct-Status-Type	Indicates whether this Accounting-Request marks the beginning of the user service (Start) or the end (Stop).
Acct-Delay-Time	Indicates how many seconds the client tried to authenticate send this record for, and can be subtracted from the time of arrival on the server to find the approximate time of the event generating this Accounting-Request.
Acct-Authentic	Indicates how the user was authenticated, whether by RADIUS (AAA), Local (Internal CP) or Remote (External CP). The field displays one of the following values: • 1 — AAA authentication • 2 — Internal CP authentication • 3 — External CP authentication
Framed-IP-Address	Indicates the address to be configured for the user
Connect-Info	This field is sent from the NAS to indicate the nature of the users' connection — 802.11b for Radio **b**/**g** or 802.11a for radio **a**.
NAS-Port-Type	Indicates RADIUS NAS Port Type is Wireless 802.11
Called-Station-ID	The Wireless AP's MAC address.
Calling-Station-ID	The client's MAC address.
Siemens-AP-Serial	The Wireless AP's serial number.
Siemens-AP-Name	The Wireless AP's name.
Siemens-VNS-Name	The VNS name on which the session took place.
Siemens-SSID	The SSID name on which the session took place.
Acct-Session-Time	The number of seconds the user has received the service.
Acct-Output-Packets	The number of packets that were sent to the port in the course of delivering this service to a framed user.
Acct-Input-Packets	The number of packets that have been received from the port over the course of this service being provided to a Framed User.
Acct-Output-Octets	The number of octets that were sent to the port in the course of delivering the service.
Acct-Input-Octets	The number of octets that were received from the port over the course of the service.

Table 16-2 CDR Records and Their Description (continued)

CDR Records	Description
Acct-Terminate-Cause	Indicates how the session was terminated. The field displays one of the following values: • **1** — User Request **4** — Idle Timeout • **5** — Session Timeout • **6** — Admin Reset • **11** — NAS Reboot • **16** — Callback • **17** — User Error
Authenticated_time	Indicates the time at which the client was authenticated. The time is in the following format: **Date hh:mm:ss**. For example, **April 21 2008 14:50:24**
Disassociation_time	Indicates the time at which the client was disassociated from the Wireless AP. The time is in the following format: **Date hh:mm:ss**. For example, **April 21 2008 14:57:20**.

Viewing CDRs

The following is a high-level overview of how to view CDRs:

1. Back up the CDR files on the local drive of the SCALANCE IWLAN Controller.
2. Copy the CDR files from the SCALANCE IWLAN Controller to the remote server.
3. Unzip the file.
4. Download the CDR files from the remote server to view CDRs.

Note:
You cannot access the CDR files directly from the CDR directory.

When you back up CDRs, both the **.work** and **.dat** files are zipped into a single .zip file. This .zip file is uploaded on the remote server. You can unzip this file from the remote server to extract the **.work** and **.dat** files.

You can back up and upload the files on the remote server either via the SCALANCE IWLAN Assistant (GUI) or CLI.

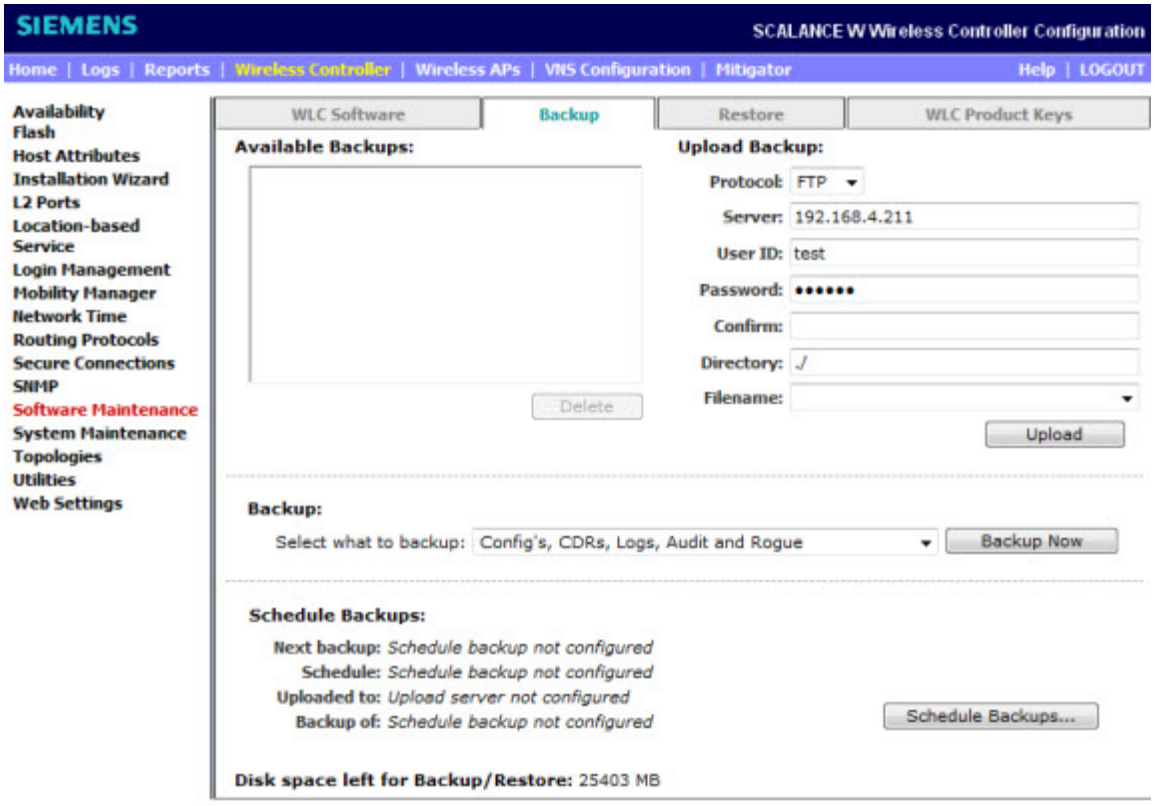
This section describes how to back up and copy the CDR files to a remote server via the SCALANCE IWLAN Assistant (GUI). For more information on how to copy the CDR file to the remote server via CLI, refer to the SCALANCE WLC711 *CLI Reference Guide*.

Backing Up and Copying CDR Files to a Remote Server

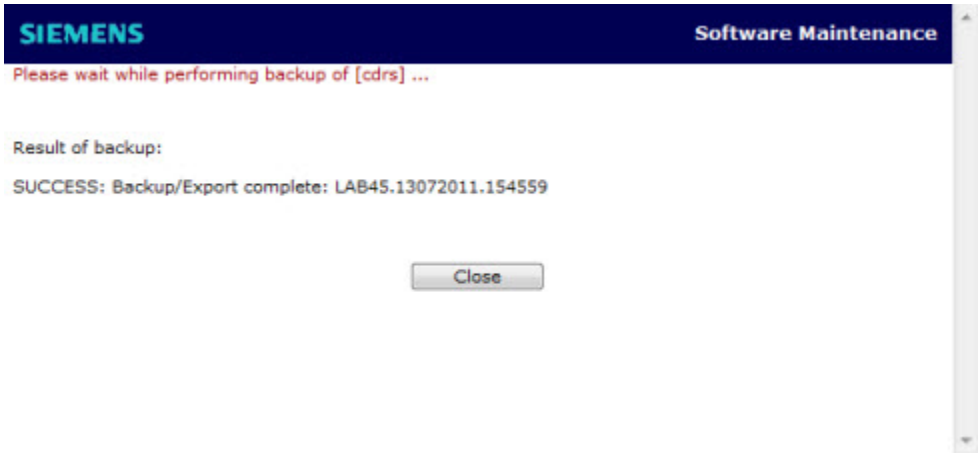
To Back Up and Copy the CDR Files to a Remote Server:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **Software Maintenance**. The **Software Maintenance** screen is displayed.

3. Click the **Backup** tab.



4. From the **Select what to backup** drop-down menu, click **CDRs only**, and then click **Backup Now**. The following window displays the backup status.



5. To close the window, click **Close**. The backed up file is displayed in the **Available Backups** box.

Note:
The **.work** and **.dat** files are zipped into a single file.

6. To upload a backup, in the **Upload Backup** section, do the following:
   - **Protocol** — Select the file transfer protocol you want to use to upload the backup file, **SCP** or **FTP**.
   - **Server** — Type the IP address of the server where the backup will be stored.

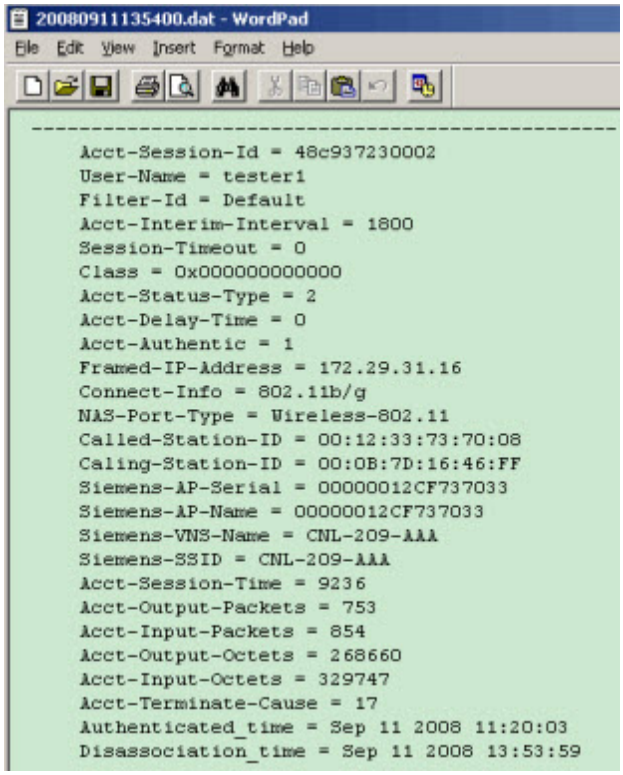
Note:
The Server Address field supports both IPv4 and IPv6 addresses.

   - **User ID** — Type the user ID to log in to the server.
   - **Password** — The password to log in to the server.
   - **Confirm** — The password to confirm the password.
   - **Directory** — The directory in which you want to upload the CDR file.
   - **Filename** — Type the zipped CDR file name.

Note:
After you back up CDRs, the zipped CDR file name is selected by default in the **Filename** box.

7. In the **Upload Backup** section, click **Upload**. The .zip file is uploaded on to the server.
8. Unzip the file. The two CDR files — **.work** and **.dat** — are visible on the server.
9. To view CDRs, download the files.

Figure 16-1 Sample .dat File



17

Performing System Administration

This chapter describes system administration processes, including:

For information about...	Refer to page...
Performing Wireless AP Client Management	17-1
Defining SCALANCE W Wireless Assistant Administrators and Login Groups	17-5

Performing Wireless AP Client Management

There are times when for business, service, or security reasons you want to cut the connection with a particular wireless device. You can view all the associated wireless devices, by MAC address, on a selected Wireless AP and do the following:

- Disassociate a selected wireless device from its Wireless AP.
- Add a selected wireless device's MAC address to a blacklist of wireless clients that will not be allowed to associate with the Wireless AP.
- Backup and restore the SCALANCE IWLAN Controller database. For more information, see the SCALANCE WLC711 *Maintenance Guide*.

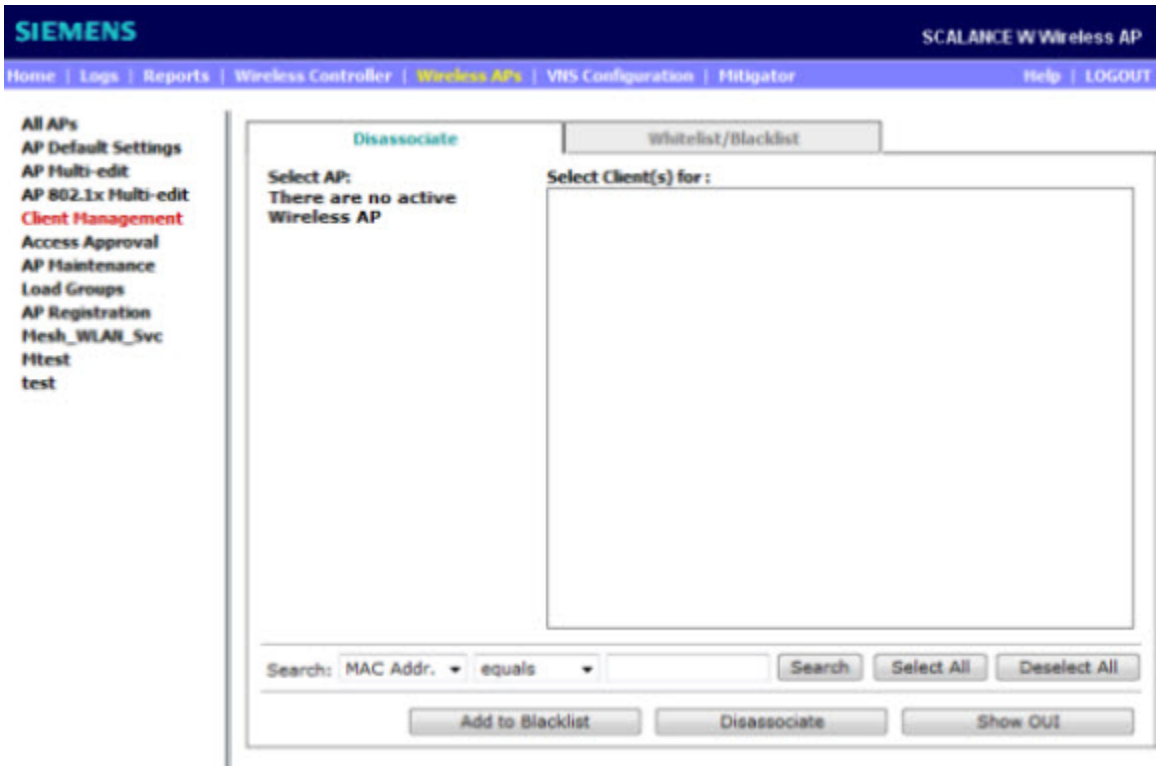
Disassociating a Client

In addition to the following procedure below, you can also disassociate wireless users directly from the **Active Clients by VNS** screen. For more information, see Chapter 16, **Working with Reports and Statistics**.

To Disassociate a Wireless Device Client:

1. From the top menu, click **Wireless APs**. The Wireless AP **Configuration** screen is displayed.

2. In the left pane, click **Client Management**. The **Disassociate** tab is displayed.



3. In the **Select AP** list, click the AP that is connected to the client that you want to disassociate.
4. In the **Select Client(s)** list, select the checkbox next to the client you want to disassociate.

Note:
You can search for a client by MAC Address, IP Address or User ID, by selecting the search parameters from the drop-down lists and typing a search string in the **Search** box and clicking **Search**. You can also use the **Select All** or **Clear All** buttons to help you select multiple clients.

5. Click **Disassociate**. The client's session terminates immediately.

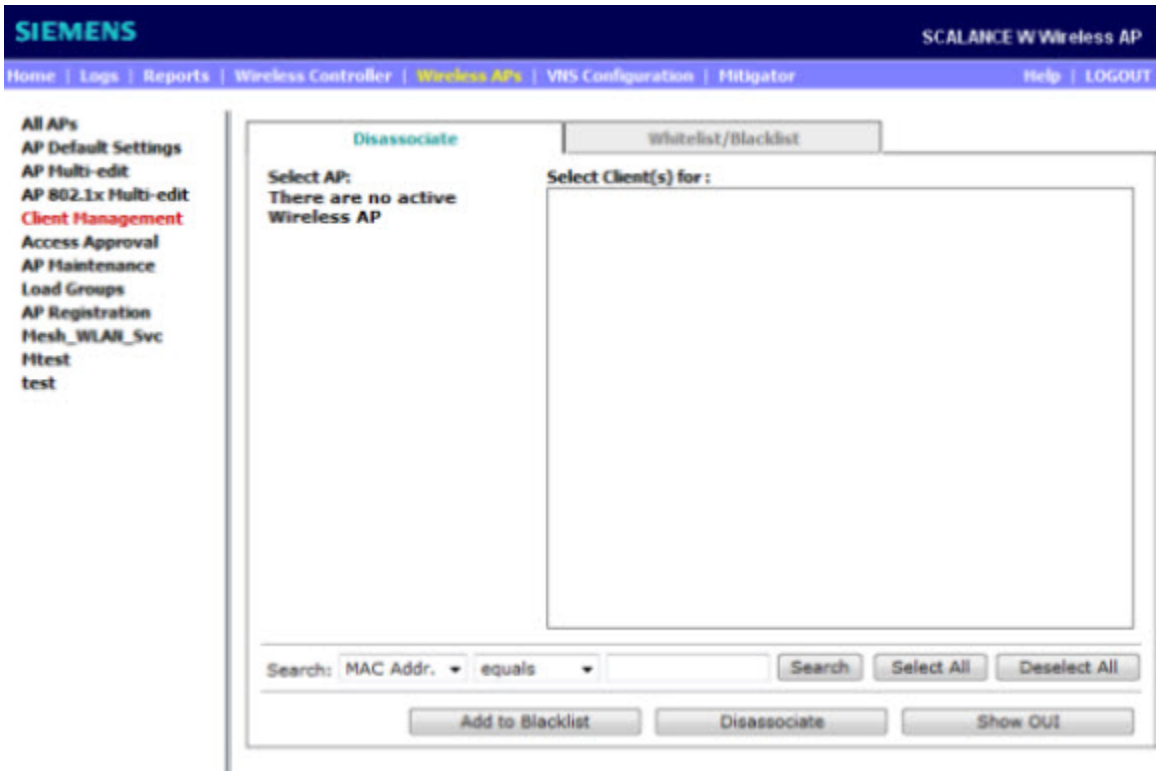
Blacklisting a Client

The **Whitelist/Blacklist** tab displays the current list of MAC addresses that are not allowed to associate. A client is added to the blacklist by selecting it from a list of associated APs or by typing its MAC address.

To Blacklist a Wireless Device Client:

1. From the top menu, click **Wireless APs**. The Wireless AP **Configuration** screen is displayed.

2. In the left pane, click **Client Management**. The **Disassociate** tab is displayed.



3. In the **Select AP** list, click the AP that is connected to the client that you want to blacklist.
4. In the **Select Client(s)** list, select the checkbox next to the client you want to blacklist, if applicable.

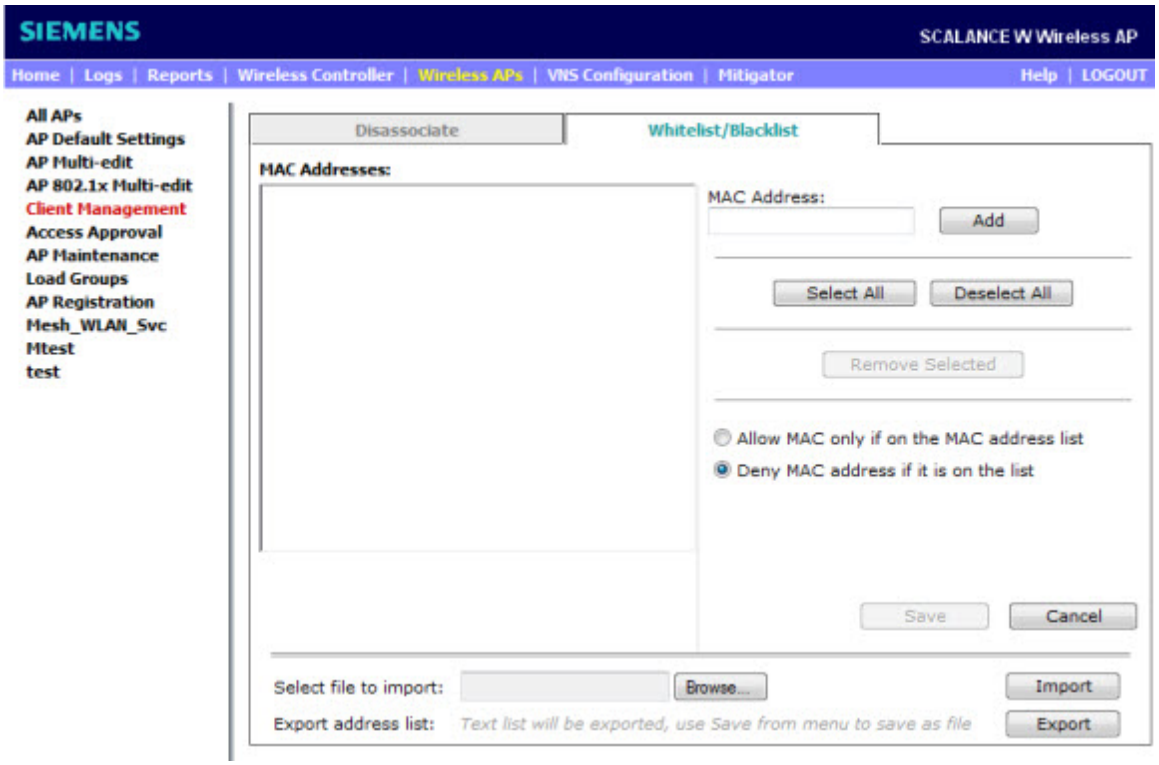
Note:
You can search for a client by MAC Address, IP Address or User ID, by selecting the search parameters from the drop-down lists and typing a search string in the **Search** box and clicking **Search**. You can also use the **Select All** or **Clear All** buttons to help you select multiple clients.

5. Click **Add to Blacklist**. The selected wireless client's MAC address is added to the blacklist.

To Blacklist a Wireless Device Client Using Its MAC Address:

1. From the top menu, click **Wireless APs**. The Wireless AP **Configuration** screen is displayed.
2. In the left pane, click **Client Management**. The **Disassociate** tab is displayed.

3. Click the **Whitelist/Blacklist** tab.



4. To add a new MAC address to the blacklist, in the **MAC Address** box type the client's MAC address.
5. Click **Add**. The client is displayed in the **MAC Addresses** list.

Note:
You can use the **Select All** or **Clear All** buttons to help you select multiple clients.

6. To save your changes, click **Save**.

To Clear an Address from the Blacklist:

1. From the top menu, click **Wireless APs**. The Wireless AP **Configuration** screen is displayed.
2. In the left pane, click **Client Management**. The **Disassociate** tab is displayed.
3. Click the **Whitelist/Blacklist** tab.
4. To clear an address from the blacklist, select the corresponding checkbox in the **MAC Addresses** list.
5. Click **Remove Selected**. The selected client is removed from the list.

Note:
You can use the **Select All** or **Clear All** buttons to help you select multiple clients.

6. To save your changes, click **Save**.

To Import a List of MAC Addresses for the Blacklist:

1. From the top menu, click **Wireless APs**. The Wireless AP **Configuration** screen is displayed.

2. In the left pane, click **Client Management**. The **Disassociate** tab is displayed.
3. Click the **Whitelist/Blacklist** tab.
4. Click **Browse** and navigate to the file of MAC addresses you want to import and add to the blacklist.
5. Click the file, and then click **Import**. The list of MAC addresses is imported.

To Export a List of MAC Addresses for the Blacklist:

1. From the top menu, click **Wireless APs**. The Wireless AP **Configuration** screen is displayed.
2. In the left pane, click **Client Management**. The **Disassociate** tab is displayed.
3. Click the **Whitelist/Blacklist** tab.
4. Click **Export**. The saved blacklist file is exported.
5. To export the current blacklist, use the browser's save option to save the file as a text (.txt) file. It is recommend that a descriptive file name is used.

Defining SCALANCE W Wireless Assistant Administrators and Login Groups

You can define the login user names and passwords for administrators that have access to the SCALANCE W Wireless Assistant. You can also assign them to a login group — as full administrators, read-only administrators, or as GuestPortal managers. For each user added, you can define and modify a user ID and password.

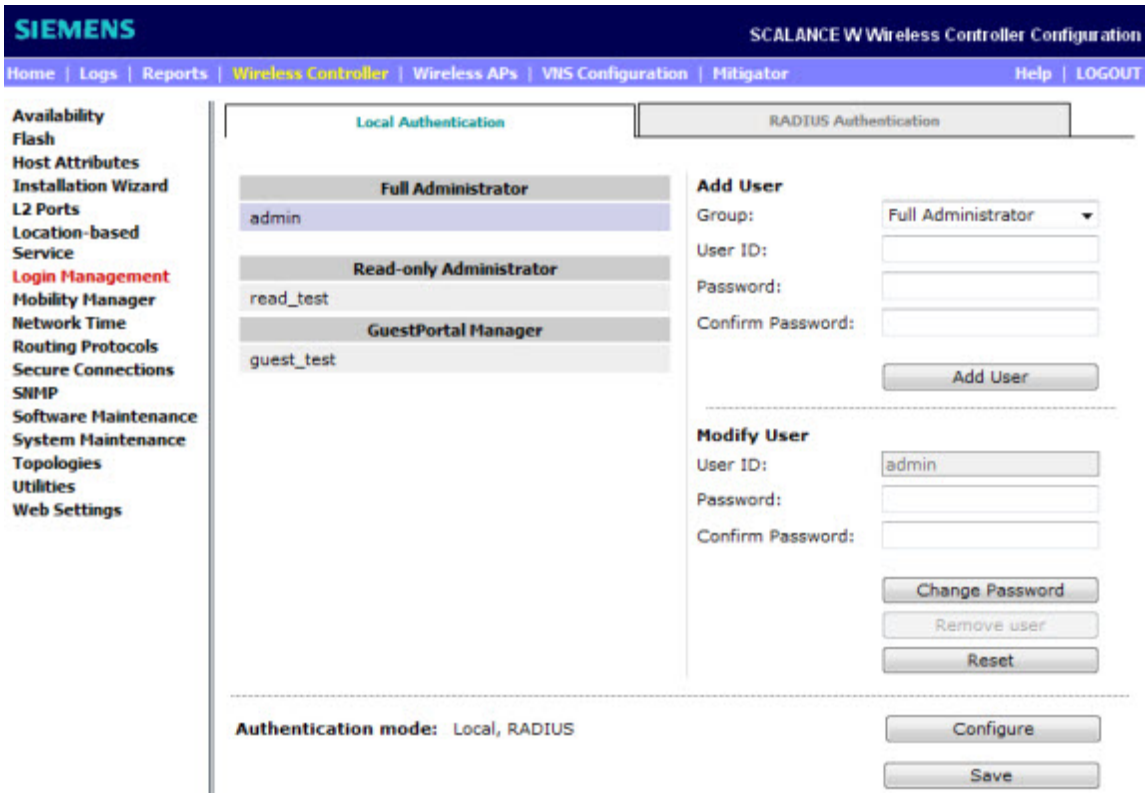
- **Full administrators** — Users assigned to this login group have full administrator access rights on the SCALANCE IWLAN Controller. Full administrators can manage all aspects of the SCALANCE IWLAN Controller, including GuestPortal user accounts.
- **Read-only administrators** — Users assigned to this login group have read-only access rights on the SCALANCE IWLAN Controller, including the GuestPortal user accounts.
- **GuestPortal managers** — Users assigned to this login group can only manage GuestPortal user accounts. Any user who logs on to the SCALANCE IWLAN Controller and is assigned to this group can only access the **GuestPortal Guest Administration** page of the SCALANCE W Wireless Assistant.

Note:
When adding or modifying a user, note the following password character constraints:
• Allowed characters include A-Z a-z 0-9 ~!@#$%^&*()_+|-=\{}[];<>?,.
• Characters not allowed include / ` ' " : and space is not valid

To Add a SCALANCE IWLAN Controller Administrator to a Login Group:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.

2. In the left pane, click **Login Management**. The **Local Authentication** tab is displayed.



3. In the **Group** drop-down list, click one of the following:
   - **Full Administrator** — Users assigned to this login group have full administrator access rights on the SCALANCE IWLAN Controller.

     Full administrators can manage GuestPortal user accounts.
   - **Read-only Administrator** — Users assigned to this login group have read-only access rights on the SCALANCE IWLAN Controller.

     Read-only administrators have read access to the GuestPortal user accounts.
   - **GuestPortal Manager** — Users assigned to this login group can only manage GuestPortal user accounts. Any user who logs on to the SCALANCE IWLAN Controller and is assigned to this group can only access the **GuestPortal Guest Administration** page of the SCALANCE W Wireless Assistant. For more information, see "Working with GuestPortal Administration" on page 19-1.
4. In the **User ID** box, type the user ID for the new user. A user ID can only be used once, in only one category.
5. In the **Password** box, type the password for the new user.
6. **In the Confirm Password, re-type the password.**
7. Click **Add User**. The new user is added to the appropriate login group list.

To Modify a SCALANCE IWLAN Controller Administrator's Password:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.

2. In the left pane, click **Login Management**. The **Local Authentication** tab is displayed.
3. Click the user whose password you want to modify.
4. In the **Password** box, type the new password for the user.
5. **In the Confirm Password, re-type the new password**.
6. To change the password, click **Change Password**.

To Remove a SCALANCE IWLAN Controller Administrator:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.
2. In the left pane, click **Login Management**. The **Local Authentication** tab is displayed.
3. Click the user you want to remove.
4. Click **Remove user**. The user is removed from the list.

18

Logs, Traces, Audits and DHCP Messages

This chapter describes SCALANCE IWLAN Controller logs, traces, audits, and DHCP messages, including:

For information about...	Refer to page...
SCALANCE IWLAN Controller Messages	18-1
Working with Logs	18-2
Viewing Wireless AP Traces	18-8
Viewing Audit Messages	18-9
Viewing the DHCP Messages	18-10
Viewing Software Upgrade Messages	18-12
Viewing Configuration Restore/Import Messages	18-13

SCALANCE IWLAN Controller Messages

The SCALANCE IWLAN Controller generates four types of messages:

- **Logs (including alarms)** – Messages that are triggered by events
- **Traces** – Messages that display activity by component, for system debugging, troubleshooting, and internal monitoring of software

NOTICE

In order for the **Debug Info** option on the **Wireless AP Traces** screen to return trace messages, this option must be enabled while Wireless AP debug commands are running. To do so, you need to run a Wireless AP CLI command to turn on a specific Wireless AP debug. Once the CLI command is run, select the **Debug Info** option, and then click **Retrieve Traces**. For more information, see the *SCALANCE IWLAN Controller CLI Reference Guide*.

Because Wireless AP debugging can affect the normal operation of Wireless AP service, enabling debugging is not recommended unless specific instructions are provided.

- **Audits** – Messages that record administrative changes made to the system
- **DHCP** – Messages that record DHCP service events

Working with Logs

The log messages contain the time of event, severity, source component, and any details generated by the source component. Log messages are divided into three groups:

- Controller logs
- Wireless AP logs
- Login logs

Log Severity Levels

Log messages are classified at four levels of severity:

- Information (the activity of normal operation)
- Minor (alarm)
- Major (alarm)
- Critical (alarm)

The alarm messages (minor, major or critical log messages) are triggered by activities that meet certain conditions that should be known and dealt with. The following are examples of events on the SCALANCE IWLAN Controller that generate an alarm message:

- Reboot due to failure
- Software upgrade failure on the SCALANCE IWLAN Controller
- Software upgrade failure on the Wireless AP
- Detection of rogue access point activity without valid ID
- Availability configuration not identical on the primary and secondary SCALANCE IWLAN Controller

If SNMP is enabled on the SCALANCE IWLAN Controller, alarm conditions will trigger a trap in SNMP (Simple Network Management Protocol). An SNMP trap is an event notification sent by the managed agent (a network device) to the management system to identify the occurrence of conditions.

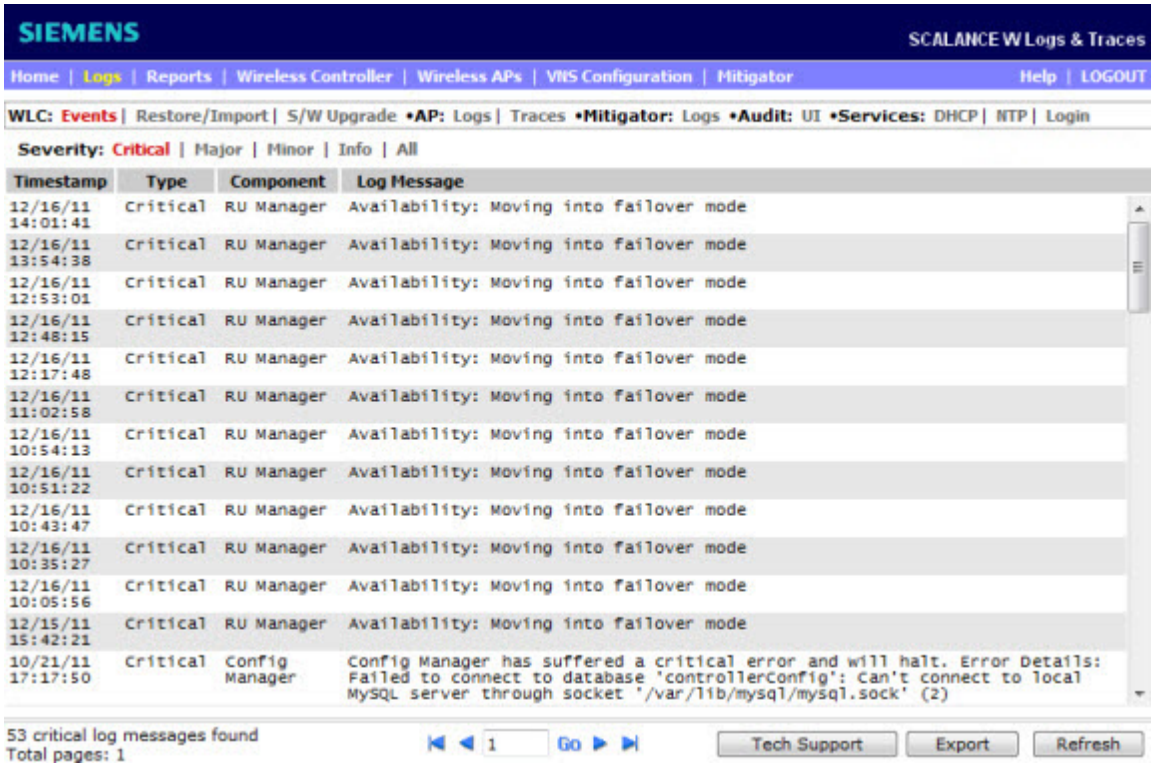
Note:
The log statements **Low water mark level was reached** and **Incoming message dropped, because of the rate limiting mechanism** indicate that there is a burst of log messages coming to the event server and the processing speed is slower than the incoming rate of log messages. These messages do not indicate that the system is impaired in any way.

Viewing the SCALANCE IWLAN Controller Logs

To View SCALANCE IWLAN Controller Logs:

1. From the top menu, click **Logs**. The **Logs & Traces** screen is displayed.

2. Click the **WLC: Events** tab. The **SCALANCE IWLAN Controller** log screen is displayed and the events are displayed in chronological order.


SIEMENS
SCALANCE W Logs & Traces
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
WLC: Events | Restore/Import | S/W Upgrade •AP: Logs | Traces •Mitigator: Logs •Audit: UI •Services: DHCP | NTP | Login
Severity: Critical | Major | Minor | Info | All
Timestamp
Type
Component
Log Message
12/16/11 14:01:41 Critical RU Manager Availability: Moving into failover mode
12/16/11 13:54:38 Critical RU Manager Availability: Moving into failover mode
12/16/11 12:53:01 Critical RU Manager Availability: Moving into failover mode
12/16/11 12:48:15 Critical RU Manager Availability: Moving into failover mode
12/16/11 12:17:48 Critical RU Manager Availability: Moving into failover mode
12/16/11 11:02:58 Critical RU Manager Availability: Moving into failover mode
12/16/11 10:54:13 Critical RU Manager Availability: Moving into failover mode
12/16/11 10:51:22 Critical RU Manager Availability: Moving into failover mode
12/16/11 10:43:47 Critical RU Manager Availability: Moving into failover mode
12/16/11 10:35:27 Critical RU Manager Availability: Moving into failover mode
12/16/11 10:05:56 Critical RU Manager Availability: Moving into failover mode
12/15/11 15:42:21 Critical RU Manager Availability: Moving into failover mode
10/21/11 17:17:50 Critical Config Manager Config Manager has suffered a critical error and will halt. Error Details: Failed to connect to database 'controllerConfig': Can't connect to local MySQL server through socket '/var/lib/mysql/mysql.sock' (2)
53 critical log messages found
Total pages: 1
Go
Tech Support
Export
Refresh

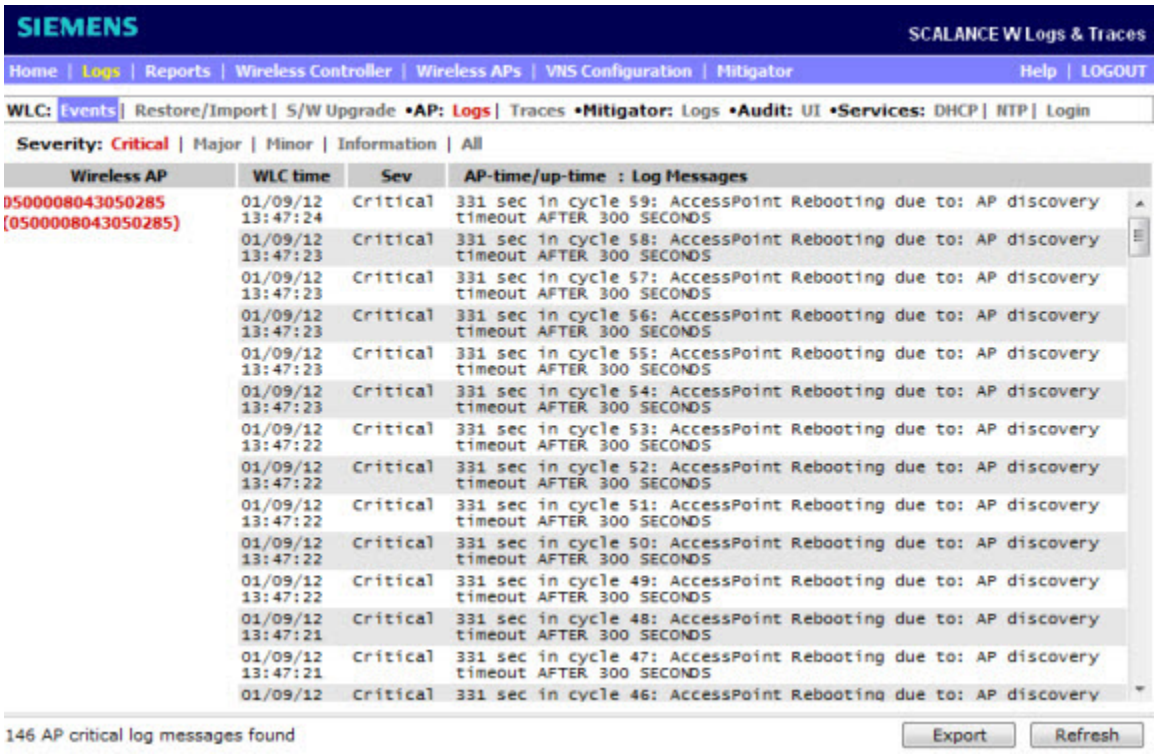
3. To sort the events by **Timestamp, Type,** or **Component**, click the appropriate column heading.
4. To filter the events by severity, **Critical**, **Major**, **Minor**, **Info**, and **All**, click the appropriate log severity.
5. To refresh the SCALANCE IWLAN Controller log screen, click **Refresh**.
6. To export the SCALANCE IWLAN Controller log screen, click **Export**. The **File Download** dialog is displayed.
7. Do one of the following:
   - To open the log file, click **Open**.
   - To save the log file, click **Save**, and then navigate to the directory location you want to save the file. Click **Save**.

Note:
The component 'Langley' is the term for the inter-process messaging infrastructure on the SCALANCE IWLAN Controller.

Viewing Wireless AP Logs

To View Wireless AP Logs:

1. From the top menu, click **Logs**. The **Logs & Traces** screen is displayed.
2. Click the **AP: Logs** tab. The Wireless AP log screen is displayed and the events are displayed in chronological order.


SIEMENS
SCALANCE W Logs & Traces
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
WLC: Events | Restore/Import | S/W Upgrade •AP: Logs | Traces •Mitigator: Logs •Audit: UI •Services: DHCP | NTP | Login
Severity: Critical | Major | Minor | Information | All
Wireless AP
WLC time
Sev
AP-time/up-time : Log Messages
0500008043050285
(0500008043050285)
01/09/12 13:47:24 Critical 331 sec in cycle 59: AccessPoint Rebooting due to: AP discovery timeout AFTER 300 SECONDS
01/09/12 13:47:23 Critical 331 sec in cycle 58: AccessPoint Rebooting due to: AP discovery timeout AFTER 300 SECONDS
01/09/12 13:47:23 Critical 331 sec in cycle 57: AccessPoint Rebooting due to: AP discovery timeout AFTER 300 SECONDS
01/09/12 13:47:23 Critical 331 sec in cycle 56: AccessPoint Rebooting due to: AP discovery timeout AFTER 300 SECONDS
01/09/12 13:47:23 Critical 331 sec in cycle 55: AccessPoint Rebooting due to: AP discovery timeout AFTER 300 SECONDS
01/09/12 13:47:23 Critical 331 sec in cycle 54: AccessPoint Rebooting due to: AP discovery timeout AFTER 300 SECONDS
01/09/12 13:47:22 Critical 331 sec in cycle 53: AccessPoint Rebooting due to: AP discovery timeout AFTER 300 SECONDS
01/09/12 13:47:22 Critical 331 sec in cycle 52: AccessPoint Rebooting due to: AP discovery timeout AFTER 300 SECONDS
01/09/12 13:47:22 Critical 331 sec in cycle 51: AccessPoint Rebooting due to: AP discovery timeout AFTER 300 SECONDS
01/09/12 13:47:22 Critical 331 sec in cycle 50: AccessPoint Rebooting due to: AP discovery timeout AFTER 300 SECONDS
01/09/12 13:47:22 Critical 331 sec in cycle 49: AccessPoint Rebooting due to: AP discovery timeout AFTER 300 SECONDS
01/09/12 13:47:21 Critical 331 sec in cycle 48: AccessPoint Rebooting due to: AP discovery timeout AFTER 300 SECONDS
01/09/12 13:47:21 Critical 331 sec in cycle 47: AccessPoint Rebooting due to: AP discovery timeout AFTER 300 SECONDS
01/09/12 Critical 331 sec in cycle 46: AccessPoint Rebooting due to: AP discovery
146 AP critical log messages found
Export
Refresh

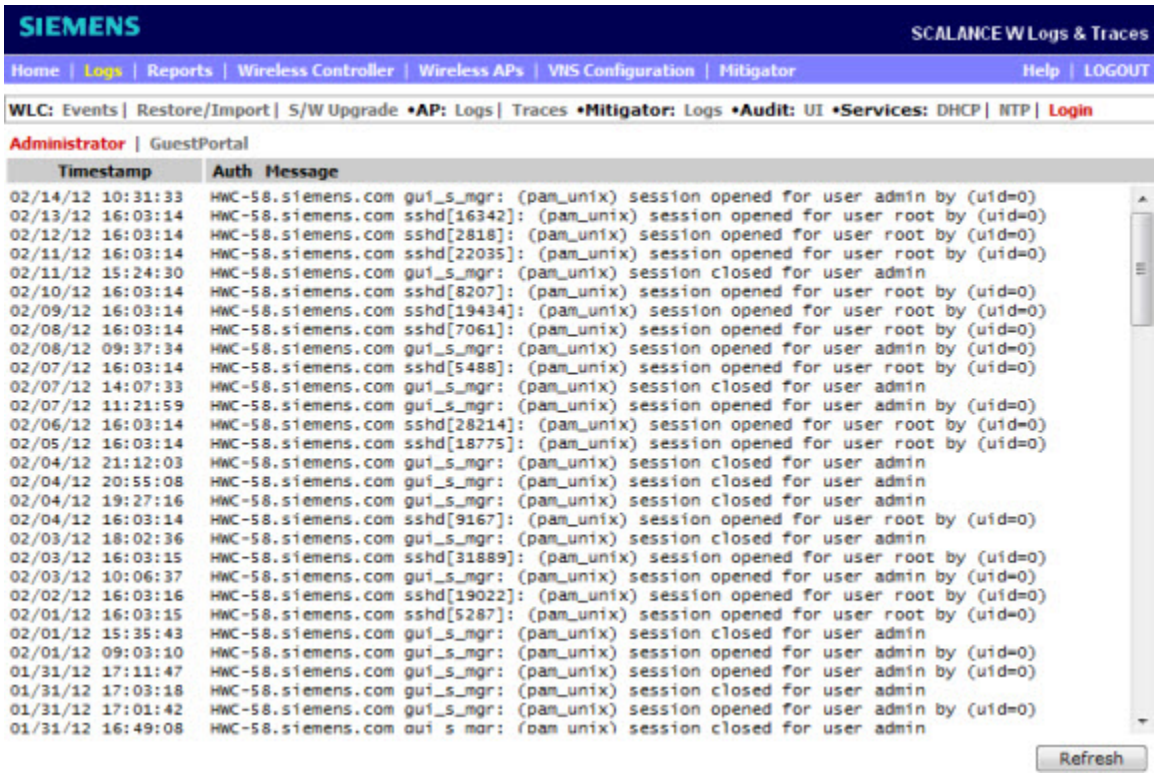
3. In the **Wireless AP** list, click a Wireless AP to view the log events for that particular Wireless AP.
4. To sort the events by **WLC time** or **Sev** (Severity), click the appropriate column heading.
5. To filter the events by severity, **Critical**, **Major**, **Minor**, **Information**, and **All**, click the appropriate log severity.
6. To refresh the SCALANCE IWLAN Controller log screen, click **Refresh**.
7. To export the SCALANCE IWLAN Controller logs, click **Export**. The **File Download** dialog is displayed.
8. Do one of the following:
   - To open the log file, click **Open**.
   - To save the log file, click **Save**, and then navigate to the directory location you want to save the file. Click **Save**.

Viewing Login Logs

To View Administrator Login Logs:

1. From the top menu, click **Logs**. The **Logs & Traces** screen is displayed.

2. Click the **Login** tab. The Login screen is displayed and the login events are displayed in chronological order.


SIEMENS
SCALANCE W Logs & Traces
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
WLC: Events | Restore/Import | S/W Upgrade •AP: Logs | Traces •Mitigator: Logs •Audit: UI •Services: DHCP | NTP | Login
Administrator | GuestPortal
Timestamp
Auth Message
02/14/12 10:31:33 HWC-58.siemens.com gui_s_mgr: (pam_unix) session opened for user admin by (uid=0)
02/13/12 16:03:14 HWC-58.siemens.com sshd[16342]: (pam_unix) session opened for user root by (uid=0)
02/12/12 16:03:14 HWC-58.siemens.com sshd[2818]: (pam_unix) session opened for user root by (uid=0)
02/11/12 16:03:14 HWC-58.siemens.com sshd[22035]: (pam_unix) session opened for user root by (uid=0)
02/11/12 15:24:30 HWC-58.siemens.com gui_s_mgr: (pam_unix) session closed for user admin
02/10/12 16:03:14 HWC-58.siemens.com sshd[8207]: (pam_unix) session opened for user root by (uid=0)
02/09/12 16:03:14 HWC-58.siemens.com sshd[19434]: (pam_unix) session opened for user root by (uid=0)
02/08/12 16:03:14 HWC-58.siemens.com sshd[7061]: (pam_unix) session opened for user root by (uid=0)
02/08/12 09:37:34 HWC-58.siemens.com gui_s_mgr: (pam_unix) session opened for user admin by (uid=0)
02/07/12 16:03:14 HWC-58.siemens.com sshd[5488]: (pam_unix) session opened for user root by (uid=0)
02/07/12 14:07:33 HWC-58.siemens.com gui_s_mgr: (pam_unix) session closed for user admin
02/07/12 11:21:59 HWC-58.siemens.com gui_s_mgr: (pam_unix) session opened for user admin by (uid=0)
02/06/12 16:03:14 HWC-58.siemens.com sshd[28214]: (pam_unix) session opened for user root by (uid=0)
02/05/12 16:03:14 HWC-58.siemens.com sshd[18775]: (pam_unix) session opened for user root by (uid=0)
02/04/12 21:12:03 HWC-58.siemens.com gui_s_mgr: (pam_unix) session closed for user admin
02/04/12 20:55:08 HWC-58.siemens.com gui_s_mgr: (pam_unix) session closed for user admin
02/04/12 19:27:16 HWC-58.siemens.com gui_s_mgr: (pam_unix) session closed for user admin
02/04/12 16:03:14 HWC-58.siemens.com sshd[9167]: (pam_unix) session opened for user root by (uid=0)
02/03/12 18:02:36 HWC-58.siemens.com gui_s_mgr: (pam_unix) session closed for user admin
02/03/12 16:03:15 HWC-58.siemens.com sshd[31889]: (pam_unix) session opened for user root by (uid=0)
02/03/12 10:06:37 HWC-58.siemens.com gui_s_mgr: (pam_unix) session opened for user admin by (uid=0)
02/02/12 16:03:16 HWC-58.siemens.com sshd[19022]: (pam_unix) session opened for user root by (uid=0)
02/01/12 16:03:15 HWC-58.siemens.com sshd[5287]: (pam_unix) session opened for user root by (uid=0)
02/01/12 15:35:43 HWC-58.siemens.com gui_s_mgr: (pam_unix) session closed for user admin
02/01/12 09:03:10 HWC-58.siemens.com gui_s_mgr: (pam_unix) session opened for user admin by (uid=0)
01/31/12 17:11:47 HWC-58.siemens.com gui_s_mgr: (pam_unix) session opened for user admin by (uid=0)
01/31/12 17:03:18 HWC-58.siemens.com gui_s_mgr: (pam_unix) session closed for user admin
01/31/12 17:01:42 HWC-58.siemens.com gui_s_mgr: (pam_unix) session opened for user admin by (uid=0)
01/31/12 16:49:08 HWC-58.siemens.com gui_s_mgr: (pam_unix) session closed for user admin
Refresh

3. To refresh the **Login** screen, click **Refresh.**

Working with GuestPortal Login Logs

To View GuestPortal Login Logs:

1. From the top menu, click **Logs.** The **Logs & Traces** screen is displayed.
2. Click the **Login** tab. The Login screen is displayed and the login events are displayed in chronological order.

3. Click **GuestPortal**. The GuestPortal login events are displayed in chronological order.

SIEMENS
SCALANCE W Logs & Traces
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
WLC: Events | Restore/Import | S/W Upgrade •AP: Logs | Traces •Mitigator: Logs •Audit: UI •Services: DHCP | NTP | Login
Administrator | GuestPortal
Timestamp
Auth Message
Mon Nov 28 11:07:12 2011: User [andy] with MAC [00:14:6C:DC:BA:51] logged off subnet [42-gp1] successfully.
Mon Nov 28 11:05:59 2011: User [andy] with MAC [00:14:6C:DC:BA:51] logged in subnet [42-gp1] successfully.
Export
Refresh

4. To export the GuestPortal log information, click **Export**. The **File Download** dialog is displayed.
5. Do one of the following:
   - To open the log file, click **Open**.
   - To save the log file, click **Save**, and then navigate to the directory location you want to save the file. Click **Save**.

Working with a Tech Support File

To Generate a Tech Support File:

1. From the top menu, click **Logs**. The **Logs & Traces** screen is displayed.
2. Ensure that the WLC**:Events** tab is selected.

3. Click the **Tech Support** button at the bottom of the page. The **Generate Tech Support File** screen is displayed.

4. Select the parameters for the tech support file:
   - Wireless Controller
   - Wireless AP
   - Logs
   - All
   - **No Stats** – If Wireless AP is selected, select this checkbox to include or exclude Wireless AP statistics in the tech support file.
5. Click **Generate New Tech Support File**. A warning message is displayed informing you that this operation may temporarily affect system performance.
6. Click **OK** to continue. The tech support file generation status is displayed.
7. When the file generation has completed, click **Close**.

To Download the Last Generated Tech Support File:

1. From the top menu, click **Logs**. The **Logs & Traces** screen is displayed.
2. Ensure that the **WLC:Events** tab is selected.
3. Click the **Tech Support** button at the bottom of the page. The **Generate Tech Support File** screen is displayed.
4. Click **Download Last Tech Support File**. The **File Download** dialog is displayed.
5. Click **Save**. The **Save as** window is displayed.
6. Navigate to the location you want to save the generated tech support file, and then click **Save**.

To Delete a Tech Support File:

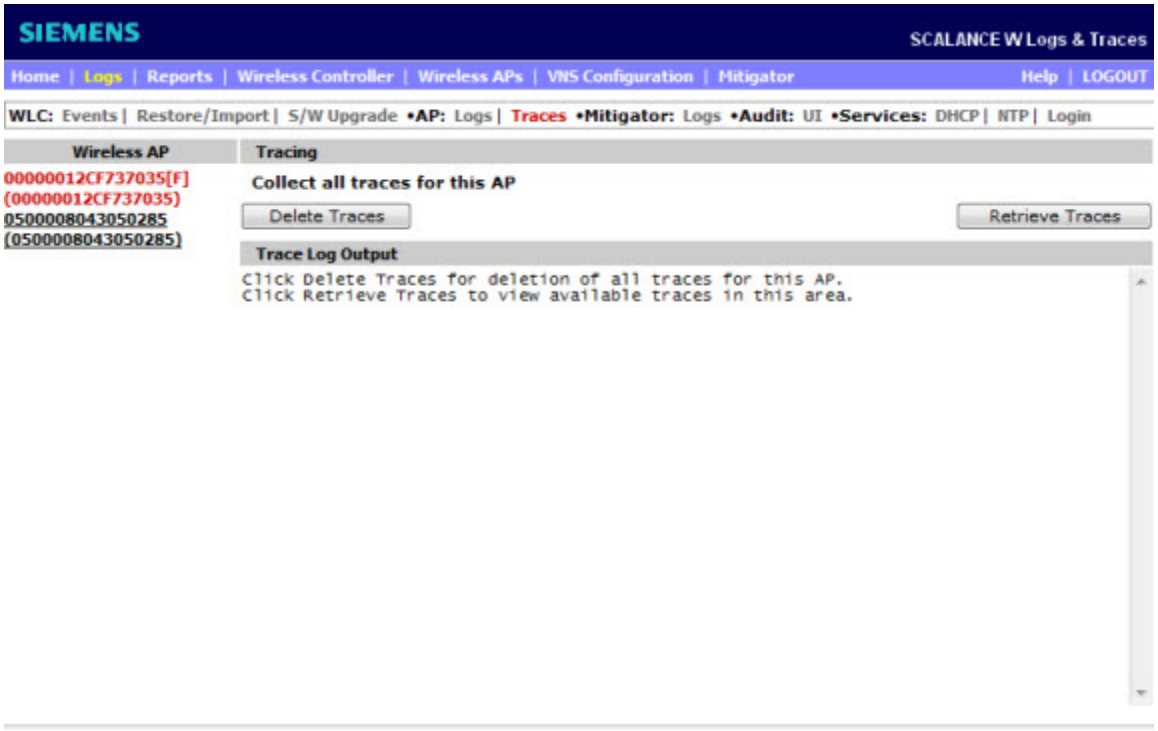
1. From the top menu, click **Logs**. The **Logs & Traces** screen is displayed.
2. Ensure that the **WLC:Events** tab is selected.
3. Click the **Tech Support** button at the bottom of the page. The **Generate Tech Support File** screen is displayed.

4. Click **List All Tech Support Files**.
5. In the drop-down list, click the tech support file you want to delete. The tech support file is deleted.
6. Click **Close**.

Viewing Wireless AP Traces

To View Wireless AP Traces:

1. From the top menu, click **Logs**. The **Logs & Traces** screen is displayed.
2. Click the **AP: Traces** tab. The Wireless AP trace screen is displayed.


SIEMENS
SCALANCE W Logs & Traces
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
WLC: Events | Restore/Import | S/W Upgrade •AP: Logs | Traces •Mitigator: Logs •Audit: UI •Services: DHCP | NTP | Login
Wireless AP
Tracing
00000012CF737035[F]
(00000012CF737035)
0500008043050285
(0500008043050285)
Collect all traces for this AP
Delete Traces
Retrieve Traces
Trace Log Output
Click Delete Traces for deletion of all traces for this AP.
Click Retrieve Traces to view available traces in this area.

NOTICE

In order for the **Debug Info** option on the **Wireless AP Traces** screen to return trace messages, this option must enabled while Wireless AP debug commands are running. To do so, you need to run a Wireless AP CLI command to turn on a specific Wireless AP debug. Once the CLI command is run, select the **Debug Info** option, and then click **Retrieve Traces**. For more information, see the *SCALANCE IWLAN Controller CLI Reference Guide*.

Because Wireless AP debugging can affect the normal operation of Wireless AP service, enabling debugging is not recommended unless specific instructions are provided.

3. In the **Wireless AP** list, click the Wireless AP whose trace messages you want to view.
4. In the **Tracing** section, do the following:
   a. **Collect traces for: Configurations** – Select to collect trace configuration information.
      - **Start/Stop Tracing** – Click to start or stop the collection of traces.

- **Retrieve Traces** – Click to view the available configuration traces in the **Trace Log Output** section.

b. **Collect traces for: Debug info** – Select to collect trace debug information.

- **Start/Stop Tracing** – Click to start or stop the collection of traces.
- **Retrieve Traces** – Click to view the available debug traces in the **Trace Log Output** section.

c. **Collect traces for: Reports** – Select to view available crash files.

- **Retrieve Traces** – Click to view available crash files in the **Trace Log Output** section.
- **Delete all crash reports** – Click to delete all crash reports.

5. To refresh the SCALANCE IWLAN Controller trace screen, click **Refresh**.
6. To export and view the Wireless AP trace screen in HTML format, click **Export**.

Viewing the Wireless 802.11n AP Traces

Wireless 802.11n AP traces are combined into a single .tar.gz file and can only be viewed by saving the .tar.gz file to a directory on your computer.

To View Wireless 802.11n AP Traces:

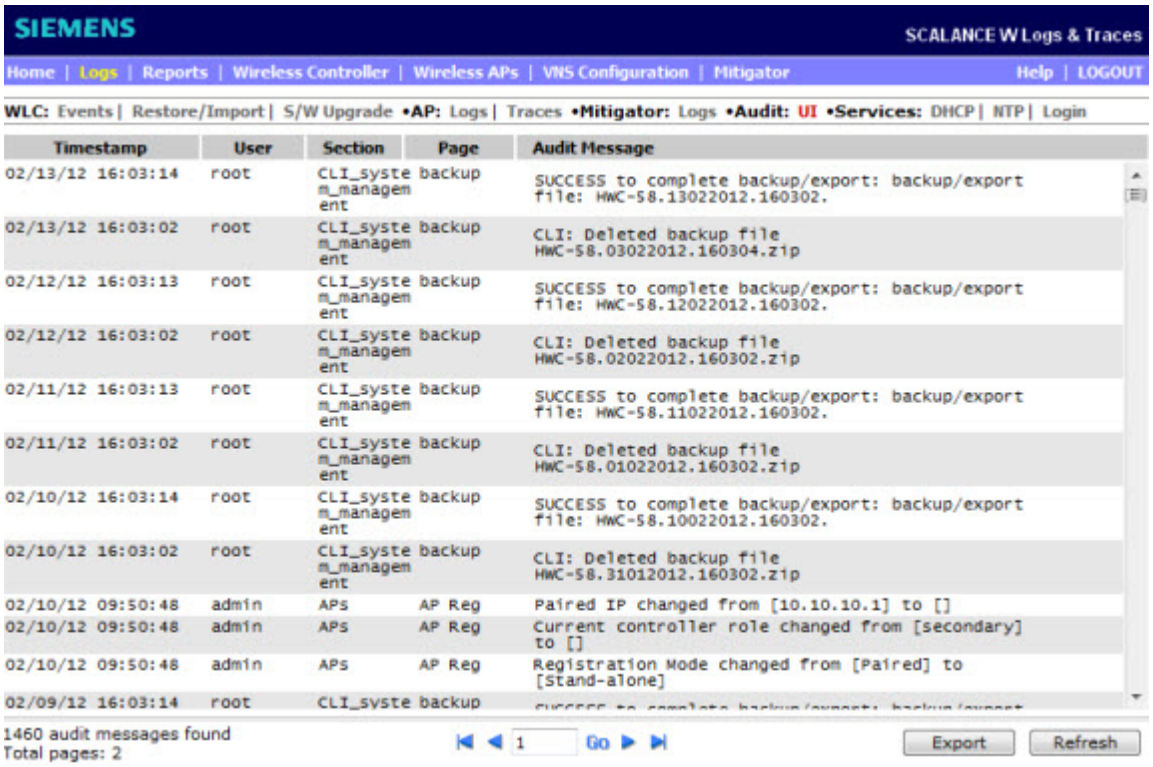
1. From the top menu, click **Logs**. The **Logs & Traces** screen is displayed.
2. Click the **AP Traces** tab. The Wireless AP trace screen is displayed.
3. In the **Active Wireless AP** list, click the Wireless 802.11n AP whose trace messages you want to view.
4. Click **Retrieve Traces**. The **File Download** dialog appears.
5. Click **Save** and navigate to the location on your computer that you want to save the Wireless 802.11n AP trace report. The file is saved as a .tar.gz file.
6. To view the file, unzip the .tar.gz file.

Viewing Audit Messages

To View Audit Messages:

1. From the top menu, click **Logs**. The **Logs & Traces** screen is displayed.

2. Click the **Audit: UI** tab. The audit screen is displayed and the events are displayed in chronological order.


SIEMENS
SCALANCE W Logs & Traces
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
WLC: Events | Restore/Import | S/W Upgrade •AP: Logs | Traces •Mitigator: Logs •Audit: UI •Services: DHCP | NTP | Login
Timestamp | User | Section | Page | Audit Message
02/13/12 16:03:14 | root | CLI_system_management | backup | SUCCESS to complete backup/export: backup/export file: HWC-58.13022012.160302.
02/13/12 16:03:02 | root | CLI_system_management | backup | CLI: Deleted backup file HWC-58.03022012.160304.zip
02/12/12 16:03:13 | root | CLI_system_management | backup | SUCCESS to complete backup/export: backup/export file: HWC-58.12022012.160302.
02/12/12 16:03:02 | root | CLI_system_management | backup | CLI: Deleted backup file HWC-58.02022012.160302.zip
02/11/12 16:03:13 | root | CLI_system_management | backup | SUCCESS to complete backup/export: backup/export file: HWC-58.11022012.160302.
02/11/12 16:03:02 | root | CLI_system_management | backup | CLI: Deleted backup file HWC-58.01022012.160302.zip
02/10/12 16:03:14 | root | CLI_system_management | backup | SUCCESS to complete backup/export: backup/export file: HWC-58.10022012.160302.
02/10/12 16:03:02 | root | CLI_system_management | backup | CLI: Deleted backup file HWC-58.31012012.160302.zip
02/10/12 09:50:48 | admin | APs | AP Reg | Paired IP changed from [10.10.10.1] to []
02/10/12 09:50:48 | admin | APs | AP Reg | Current controller role changed from [secondary] to []
02/10/12 09:50:48 | admin | APs | AP Reg | Registration Mode changed from [Paired] to [Stand-alone]
02/09/12 16:03:14 | root | CLI_system | backup
1460 audit messages found
Total pages: 2
1
Go
Export
Refresh

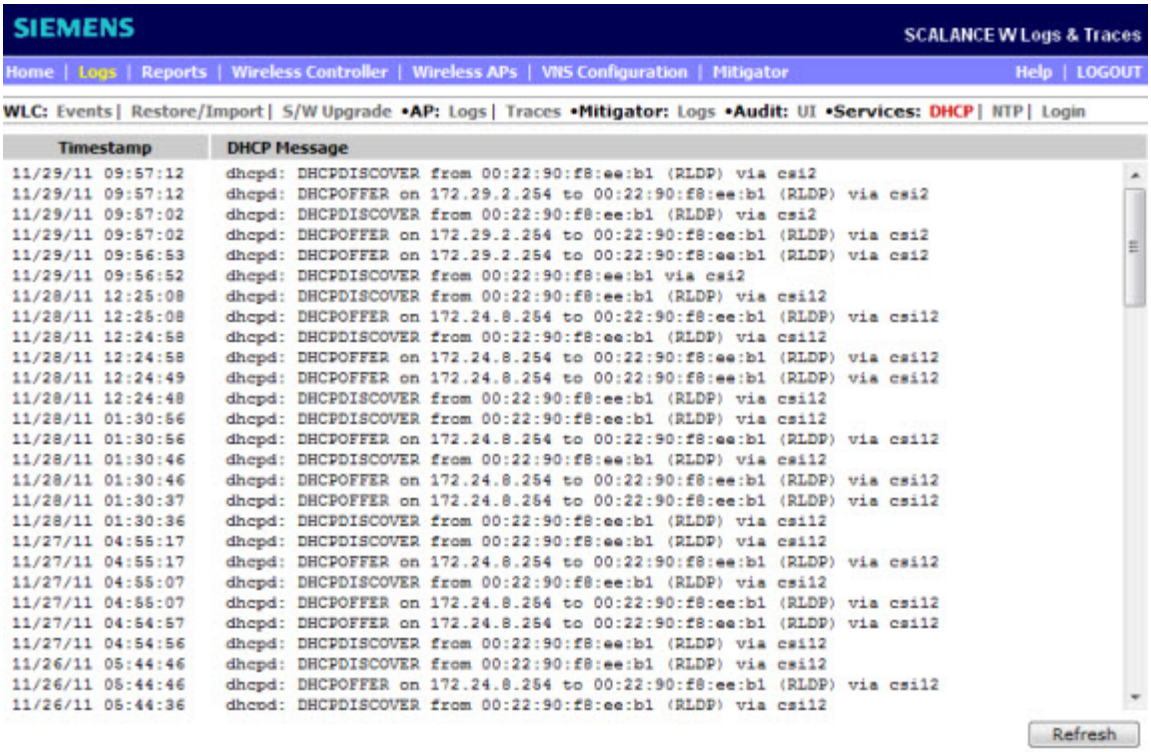
3. To sort the events by **Timestamp, User, Section, or Page**, click the appropriate column heading.
4. To refresh the audit screen, click **Refresh**.
5. To export the audit screen, click **Export**. The **File Download** dialog is displayed.
6. Do one of the following:
   - To open the audit file, click **Open**.
   - To save the audit file, click **Save**, and then navigate to the directory location you want to save the file. Click **Save**.

Viewing the DHCP Messages

To View DHCP Messages:

1. From the top menu, click **Logs**. The **Logs & Traces** screen is displayed.

2. Click the **Service: DHCP** tab. The DHCP message screen is displayed and the events are displayed in chronological order.


SIEMENS
SCALANCE W Logs & Traces
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
WLC: Events | Restore/Import | S/W Upgrade •AP: Logs | Traces •Mitigator: Logs •Audit: UI •Services: DHCP | NTP | Login
Timestamp
DHCP Message
11/29/11 09:57:12 dhcpd: DHCPDISCOVER from 00:22:90:f8:ee:b1 (RLDP) via csi2
11/29/11 09:57:12 dhcpd: DHCPOFFER on 172.29.2.254 to 00:22:90:f8:ee:b1 (RLDP) via csi2
11/29/11 09:57:02 dhcpd: DHCPDISCOVER from 00:22:90:f8:ee:b1 (RLDP) via csi2
11/29/11 09:57:02 dhcpd: DHCPOFFER on 172.29.2.254 to 00:22:90:f8:ee:b1 (RLDP) via csi2
11/29/11 09:56:53 dhcpd: DHCPOFFER on 172.29.2.254 to 00:22:90:f8:ee:b1 (RLDP) via csi2
11/29/11 09:56:52 dhcpd: DHCPDISCOVER from 00:22:90:f8:ee:b1 via csi2
11/28/11 12:25:08 dhcpd: DHCPDISCOVER from 00:22:90:f8:ee:b1 (RLDP) via csi12
11/28/11 12:25:08 dhcpd: DHCPOFFER on 172.24.8.254 to 00:22:90:f8:ee:b1 (RLDP) via csi12
11/28/11 12:24:58 dhcpd: DHCPDISCOVER from 00:22:90:f8:ee:b1 (RLDP) via csi12
11/28/11 12:24:58 dhcpd: DHCPOFFER on 172.24.8.254 to 00:22:90:f8:ee:b1 (RLDP) via csi12
11/28/11 12:24:49 dhcpd: DHCPOFFER on 172.24.8.254 to 00:22:90:f8:ee:b1 (RLDP) via csi12
11/28/11 12:24:48 dhcpd: DHCPDISCOVER from 00:22:90:f8:ee:b1 (RLDP) via csi12
11/28/11 01:30:56 dhcpd: DHCPDISCOVER from 00:22:90:f8:ee:b1 (RLDP) via csi12
11/28/11 01:30:56 dhcpd: DHCPOFFER on 172.24.8.254 to 00:22:90:f8:ee:b1 (RLDP) via csi12
11/28/11 01:30:46 dhcpd: DHCPDISCOVER from 00:22:90:f8:ee:b1 (RLDP) via csi12
11/28/11 01:30:46 dhcpd: DHCPOFFER on 172.24.8.254 to 00:22:90:f8:ee:b1 (RLDP) via csi12
11/28/11 01:30:37 dhcpd: DHCPOFFER on 172.24.8.254 to 00:22:90:f8:ee:b1 (RLDP) via csi12
11/28/11 01:30:36 dhcpd: DHCPDISCOVER from 00:22:90:f8:ee:b1 (RLDP) via csi12
11/27/11 04:55:17 dhcpd: DHCPDISCOVER from 00:22:90:f8:ee:b1 (RLDP) via csi12
11/27/11 04:55:17 dhcpd: DHCPOFFER on 172.24.8.254 to 00:22:90:f8:ee:b1 (RLDP) via csi12
11/27/11 04:55:07 dhcpd: DHCPDISCOVER from 00:22:90:f8:ee:b1 (RLDP) via csi12
11/27/11 04:55:07 dhcpd: DHCPOFFER on 172.24.8.254 to 00:22:90:f8:ee:b1 (RLDP) via csi12
11/27/11 04:54:57 dhcpd: DHCPOFFER on 172.24.8.254 to 00:22:90:f8:ee:b1 (RLDP) via csi12
11/27/11 04:54:56 dhcpd: DHCPDISCOVER from 00:22:90:f8:ee:b1 (RLDP) via csi12
11/26/11 05:44:46 dhcpd: DHCPDISCOVER from 00:22:90:f8:ee:b1 (RLDP) via csi12
11/26/11 05:44:46 dhcpd: DHCPOFFER on 172.24.8.254 to 00:22:90:f8:ee:b1 (RLDP) via csi12
11/26/11 05:44:36 dhcpd: DHCPDISCOVER from 00:22:90:f8:ee:b1 (RLDP) via csi12
Refresh

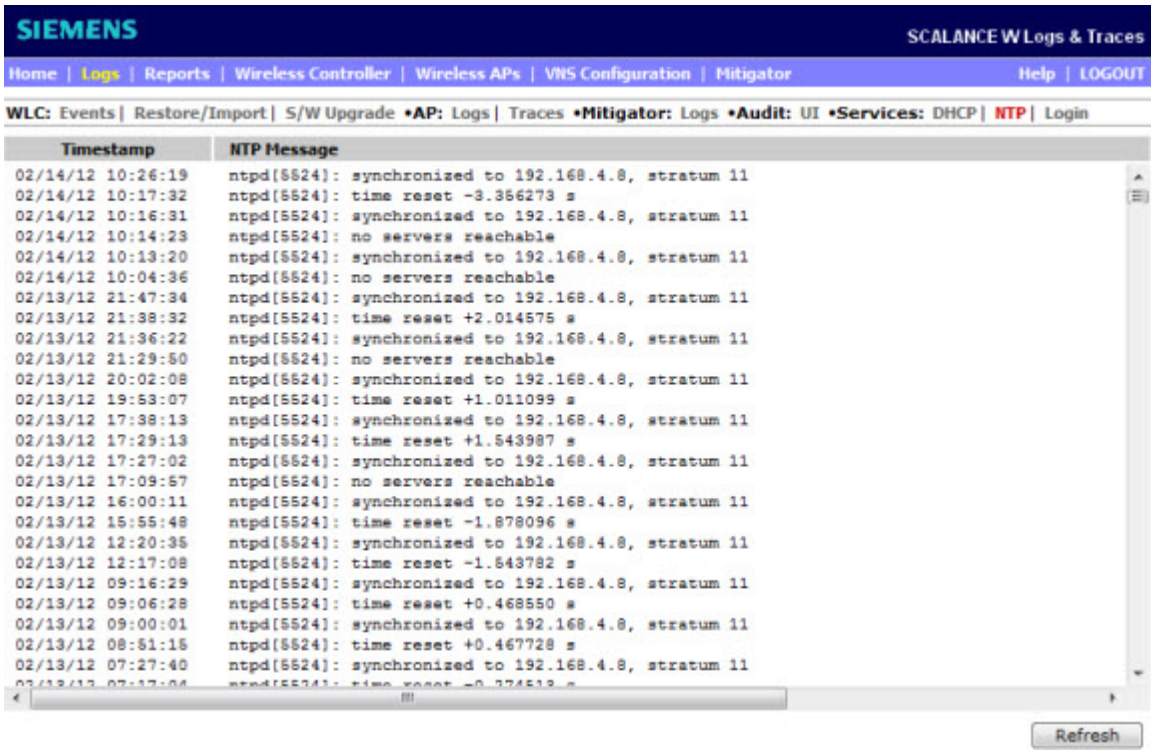
3. To sort the events by **timestamp,** click **Timestamp**.
4. To refresh the DHCP message screen, click **Refresh**.

Viewing the NTP Messages

To View NTP Messages:

1. From the top menu, click **Logs**. The **Logs & Traces** screen is displayed.

2. Click the **Service: NTP** tab. The NTP message screen is displayed and the events are displayed in chronological order.


SIEMENS
SCALANCE W Logs & Traces
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
WLC: Events | Restore/Import | S/W Upgrade •AP: Logs | Traces •Mitigator: Logs •Audit: UI •Services: DHCP | NTP | Login
Timestamp
NTP Message
02/14/12 10:26:19 ntpd[5524]: synchronized to 192.168.4.8, stratum 11
02/14/12 10:17:32 ntpd[5524]: time reset -3.386273 s
02/14/12 10:16:31 ntpd[5524]: synchronized to 192.168.4.8, stratum 11
02/14/12 10:14:23 ntpd[5524]: no servers reachable
02/14/12 10:13:20 ntpd[5524]: synchronized to 192.168.4.8, stratum 11
02/14/12 10:04:36 ntpd[5524]: no servers reachable
02/13/12 21:47:34 ntpd[5524]: synchronized to 192.168.4.8, stratum 11
02/13/12 21:38:32 ntpd[5524]: time reset +2.014575 s
02/13/12 21:36:22 ntpd[5524]: synchronized to 192.168.4.8, stratum 11
02/13/12 21:29:50 ntpd[5524]: no servers reachable
02/13/12 20:02:08 ntpd[5524]: synchronized to 192.168.4.8, stratum 11
02/13/12 19:53:07 ntpd[5524]: time reset +1.011099 s
02/13/12 17:38:13 ntpd[5524]: synchronized to 192.168.4.8, stratum 11
02/13/12 17:29:13 ntpd[5524]: time reset +1.543987 s
02/13/12 17:27:02 ntpd[5524]: synchronized to 192.168.4.8, stratum 11
02/13/12 17:09:57 ntpd[5524]: no servers reachable
02/13/12 16:00:11 ntpd[5524]: synchronized to 192.168.4.8, stratum 11
02/13/12 15:55:48 ntpd[5524]: time reset -1.878096 s
02/13/12 12:20:35 ntpd[5524]: synchronized to 192.168.4.8, stratum 11
02/13/12 12:17:08 ntpd[5524]: time reset -1.843782 s
02/13/12 09:16:29 ntpd[5524]: synchronized to 192.168.4.8, stratum 11
02/13/12 09:06:28 ntpd[5524]: time reset +0.468550 s
02/13/12 09:00:01 ntpd[5524]: synchronized to 192.168.4.8, stratum 11
02/13/12 08:51:15 ntpd[5524]: time reset +0.467728 s
02/13/12 07:27:40 ntpd[5524]: synchronized to 192.168.4.8, stratum 11
Refresh

3. To sort the events by **timestamp,** click **Timestamp**.
4. To refresh the NTP message screen, click **Refresh**.

Viewing Software Upgrade Messages

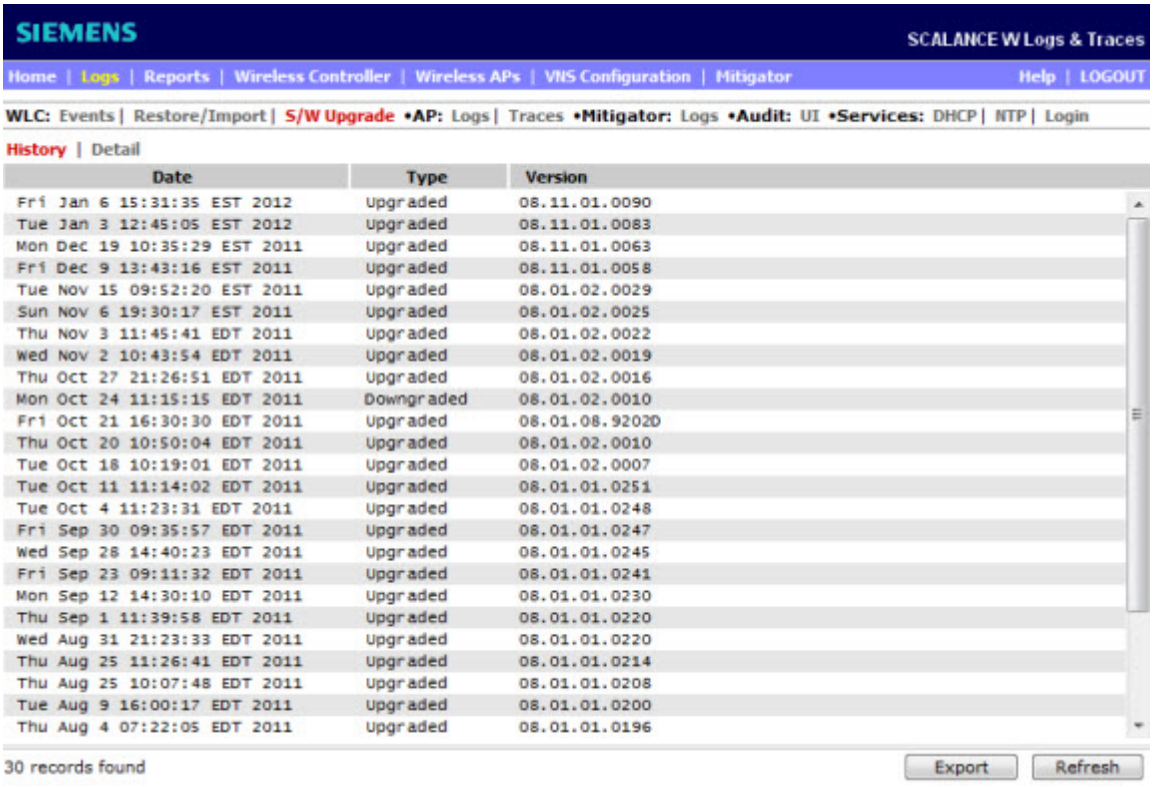
The **S/W Upgrade** tab displays the most recent upgrade actions, either success or failure, and the operating system patch history. Some examples of the upgrade actions that can be displayed are:

- FTP failure during backup of system image
- Configuration reset failure
- Configuration export failure
- Configuration import details

To View Software Upgrade Messages:

1. From the top menu, click **Logs**. The **Logs & Traces** screen is displayed.

2. Click the **S/W Upgrade** tab. The software upgrade message screen is displayed.


SIEMENS
SCALANCE W Logs & Traces
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
WLC: Events | Restore/Import | S/W Upgrade •AP: Logs | Traces •Mitigator: Logs •Audit: UI •Services: DHCP | NTP | Login
History | Detail
Date
Type
Version
Fri Jan 6 15:31:35 EST 2012 Upgraded 08.11.01.0090
Tue Jan 3 12:45:05 EST 2012 Upgraded 08.11.01.0083
Mon Dec 19 10:35:29 EST 2011 Upgraded 08.11.01.0063
Fri Dec 9 13:43:16 EST 2011 Upgraded 08.11.01.0058
Tue Nov 15 09:52:20 EST 2011 Upgraded 08.01.02.0029
Sun Nov 6 19:30:17 EST 2011 Upgraded 08.01.02.0025
Thu Nov 3 11:45:41 EDT 2011 Upgraded 08.01.02.0022
Wed Nov 2 10:43:54 EDT 2011 Upgraded 08.01.02.0019
Thu Oct 27 21:26:51 EDT 2011 Upgraded 08.01.02.0016
Mon Oct 24 11:15:15 EDT 2011 Downgraded 08.01.02.0010
Fri Oct 21 16:30:30 EDT 2011 Upgraded 08.01.08.9202D
Thu Oct 20 10:50:04 EDT 2011 Upgraded 08.01.02.0010
Tue Oct 18 10:19:01 EDT 2011 Upgraded 08.01.02.0007
Tue Oct 11 11:14:02 EDT 2011 Upgraded 08.01.01.0251
Tue Oct 4 11:23:31 EDT 2011 Upgraded 08.01.01.0248
Fri Sep 30 09:35:57 EDT 2011 Upgraded 08.01.01.0247
Wed Sep 28 14:40:23 EDT 2011 Upgraded 08.01.01.0245
Fri Sep 23 09:11:32 EDT 2011 Upgraded 08.01.01.0241
Mon Sep 12 14:30:10 EDT 2011 Upgraded 08.01.01.0230
Thu Sep 1 11:39:58 EDT 2011 Upgraded 08.01.01.0220
Wed Aug 31 21:23:33 EDT 2011 Upgraded 08.01.01.0220
Thu Aug 25 11:26:41 EDT 2011 Upgraded 08.01.01.0214
Thu Aug 25 10:07:48 EDT 2011 Upgraded 08.01.01.0208
Tue Aug 9 16:00:17 EDT 2011 Upgraded 08.01.01.0200
Thu Aug 4 07:22:05 EDT 2011 Upgraded 08.01.01.0196
30 records found
Export
Refresh

3. Do the following:
   - To view software upgrade messages, click **Detail**.
   - To view the operating system history, click **History**.
4. To refresh the screen, click **Refresh**.
5. To export the software upgrade messages or operating system history, click **Export**. The **File Download** dialog is displayed.
6. Do one of the following:
   - To open the file, click **Open**.
   - To save the file, click **Save**, and then navigate to the directory location you want to save the file. Click **Save**.

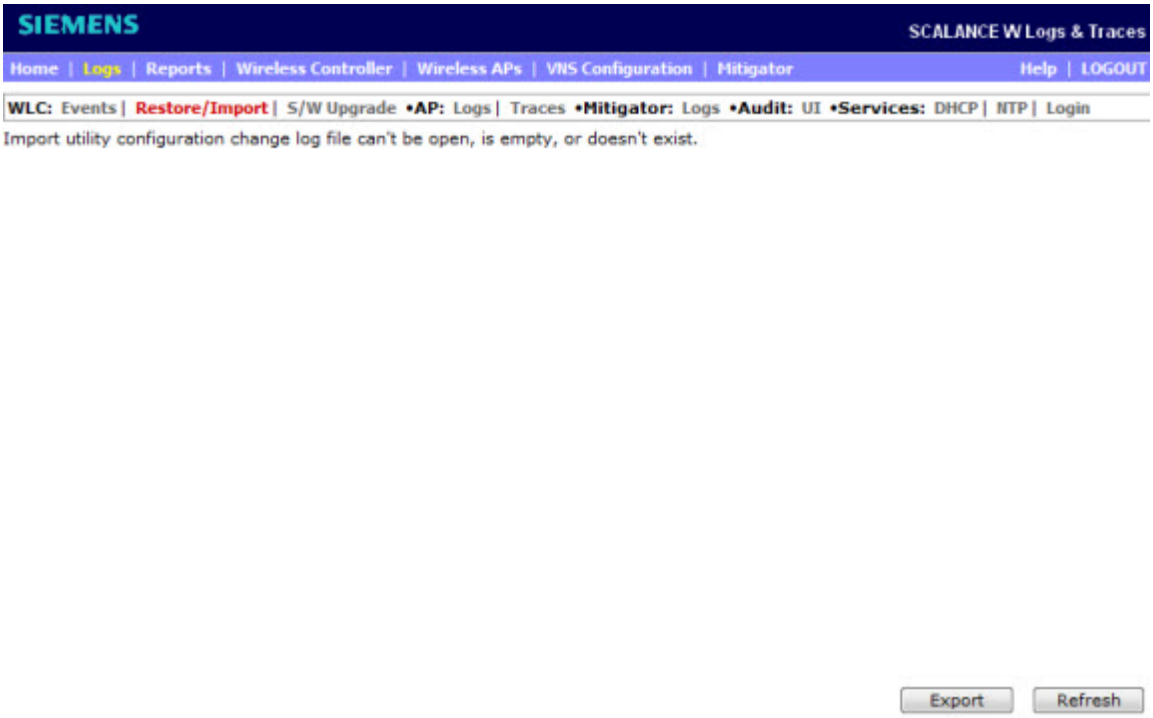
Viewing Configuration Restore/Import Messages

The **Restore/Import** tab displays the most recent configuration restore/import results.

To View Restore/Import Messages:

1. From the top menu, click **Logs**. The **Logs & Traces** screen is displayed.

2. Click the **Restore/Import** tab. The restore/import message screen is displayed.


SIEMENS
SCALANCE W Logs & Traces
Home | Logs | Reports | Wireless Controller | Wireless APs | VNS Configuration | Mitigator
Help | LOGOUT
WLC: Events | Restore/Import | S/W Upgrade •AP: Logs | Traces •Mitigator: Logs •Audit: UI •Services: DHCP | NTP | Login
Import utility configuration change log file can't be open, is empty, or doesn't exist.
Export
Refresh

3. To refresh the restore/import message screen, click **Refresh**.
4. To export the restore/import message screen, click **Export**. The **File Download** dialog is displayed.
5. Do one of the following:
   - To open the file, click **Open**.
   - To save the file, click **Save**, and then navigate to the directory location you want to save the file. Click **Save**.

19

Working with GuestPortal Administration

This chapter describes GuestPortal administration, including:

For information about...	Refer to page...
About GuestPortals	19-1
Adding New Guest Accounts	19-2
Enabling or Disabling Guest Accounts	19-4
Editing Guest Accounts	19-5
Removing Guest Accounts	19-6
Importing and Exporting a Guest File	19-7
Viewing and Printing a GuestPortal Account Ticket	19-10
Working with the GuestPortal Ticket Page	19-12
Configuring Web Session Timeouts	19-13

About GuestPortals

A GuestPortal provides wireless device users with temporary guest network services. A GuestPortal is serviced by a GuestPortal-dedicated VNS. The GuestPortal-dedicated VNS is configured by an administrator with full administrator access rights. For more information, see "Creating a GuestPortal VNS" on page 7-61.

A GuestPortal administrator is assigned to the GuestPortal Manager login group and can only create and manage guest user accounts — a GuestPortal administrator cannot access any other area of the SCALANCE W Wireless Assistant. For more information, see "Defining SCALANCE W Wireless Assistant Administrators and Login Groups" on page 17-5.

From the **GuestPortal Guest Administration** page of the SCALANCE W Wireless Assistant, you can add, edit, configure, and import and export guest accounts.

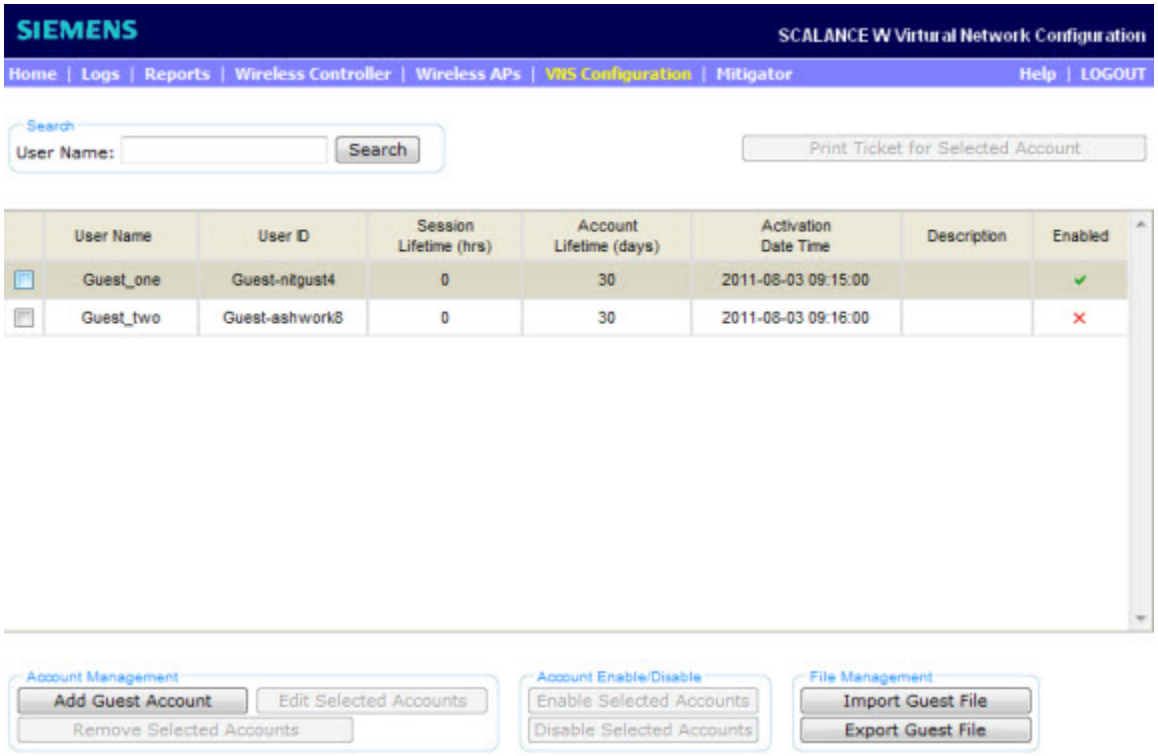
Adding New Guest Accounts

To Add a New Guest Account:

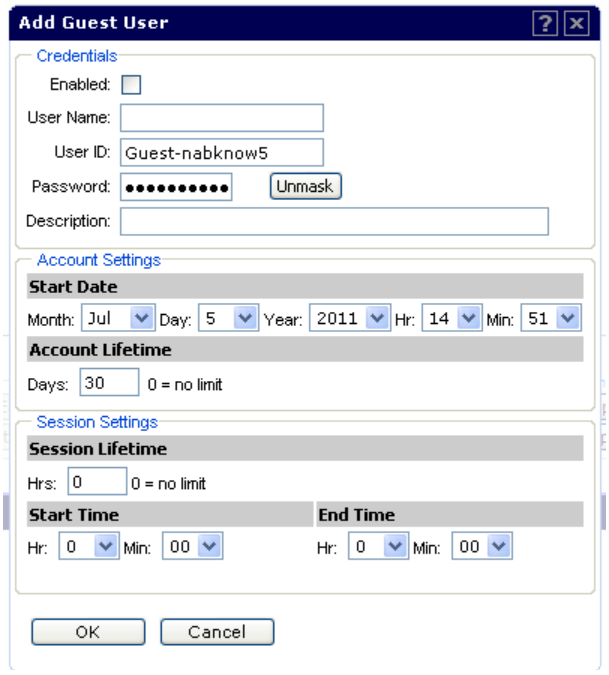
1. Do one of the following:
   - If you have GuestPortal Manager rights, log onto the SCALANCE IWLAN Controller.
   - If you have full administrator rights:
     (1) From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
     (2) In the left pane, expand the **WLAN Services** pane, click the dedicated WLAN Service that provides the temporary guest network services. The **WLAN Services** configuration window for that service displays.
     (3) Click the **Auth & Acct** tab.
     (4) Make sure the Mode is set to GuestPortal and then click **Configure**. The Configuration page displays.
     (5) In the **GuestPortal** section, click **Manage Guest Users**.

     The **GuestPortal Guest Administration** screen is displayed.

Note:
You have 3 minutes to add new guest user accounts. If that time expires, close the **GuestPortal Guest Administration** screen and click **Manage Guest Users** again. You can also increase the **Start date** time to be within 3 minutes of the current network time.



2. In the **Account Management** section, click **Add Guest Account**. The **Add Guest User** screen is displayed.



3. To enable the new guest account, select the **Enabled** checkbox. For more information, see "Enabling or Disabling Guest Accounts" on page 19-4.

4. In the **Credentials** section, do the following:
   - **User Name** — Type a user name for the person who will use this guest account.
   - **User ID** — Type a user ID for the person who will use this guest account. The default user ID can be edited.
   - **Password** — Type a password for the person who will use this guest account. The default password can be edited.

     Toggle between **Mask**/**Unmask** to hide or see the password.
   - **Description** — Type a brief description for the new guest account.

5. In the **Account Settings** section, do the following:
   - **Start date** — Specify the start date and time for the new guest account.
   - **Account lifetime** — Specify the account lifetime, in days, for the new guest account. The default **0** value specifies no limit to the account lifetime. Only a user with administrative privileges can change the value of the Account lifetime.

6. In the **Session Settings** section, do the following:
   - **Session lifetime** — Specify a session lifetime, in hours, for the new guest account. The default **0** value specifies no limit to the session lifetime. The session lifetime is the allowed cumulative total in hours spent on the network during the account lifetime.
   - **Start Time** — Specify a start time for the session for the new guest account.
   - **End Time** — Specify an end time for the session for the new guest account.

7. To save your changes, click **OK**.

Enabling or Disabling Guest Accounts

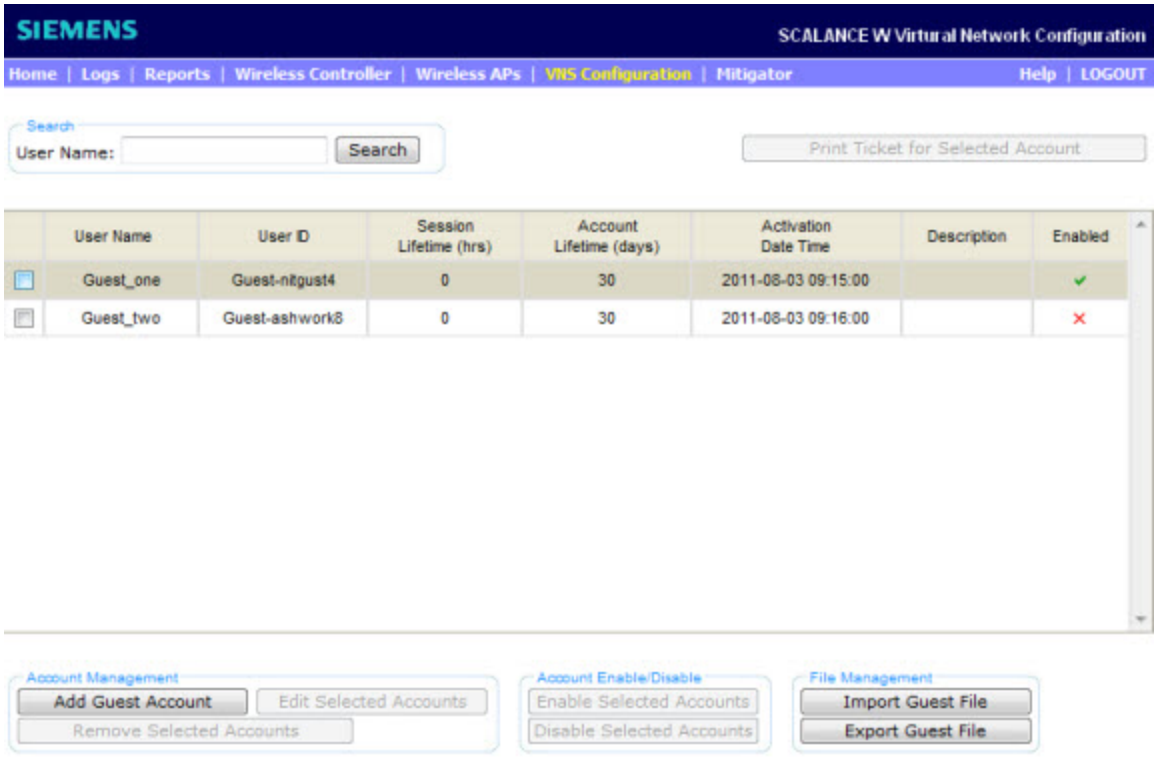
A guest account must be enabled in order for a wireless device user to use the guest account to obtain guest network services.

When a guest account is disabled, it remains in the database. A disabled guest account cannot provide access to the network.

To Enable or Disable Guest Accounts:

1. Do one of the following:
   - If you have GuestPortal Manager rights, log onto the SCALANCE IWLAN Controller.
   - If you have full administrator rights:
     (1) From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
     (2) In the left pane, expand the **WLAN Services** pane, click the dedicated WLAN Service that provides the temporary guest network services. The **WLAN Services** configuration window for that service displays.
     (3) Click the **Auth & Acct** tab, and then click **Configure**. The **Settings** screen is displayed.
     (4) In the **GuestPortal** section, click **Manage Guest Users**.

   The **GuestPortal Guest Administration** screen is displayed.



2. In the guest account list, select the checkbox next to the user name of the guest account that you want to enable or disable.

3. In the **Account Enable/Disable** section, click **Enable Selected Accounts** or **Disable Selected Accounts** accordingly. A dialog is displayed requesting you to confirm your selection.
4. Click **Ok**. A confirmation message is displayed in the **GuestPortal Guest Administration** screen footer.

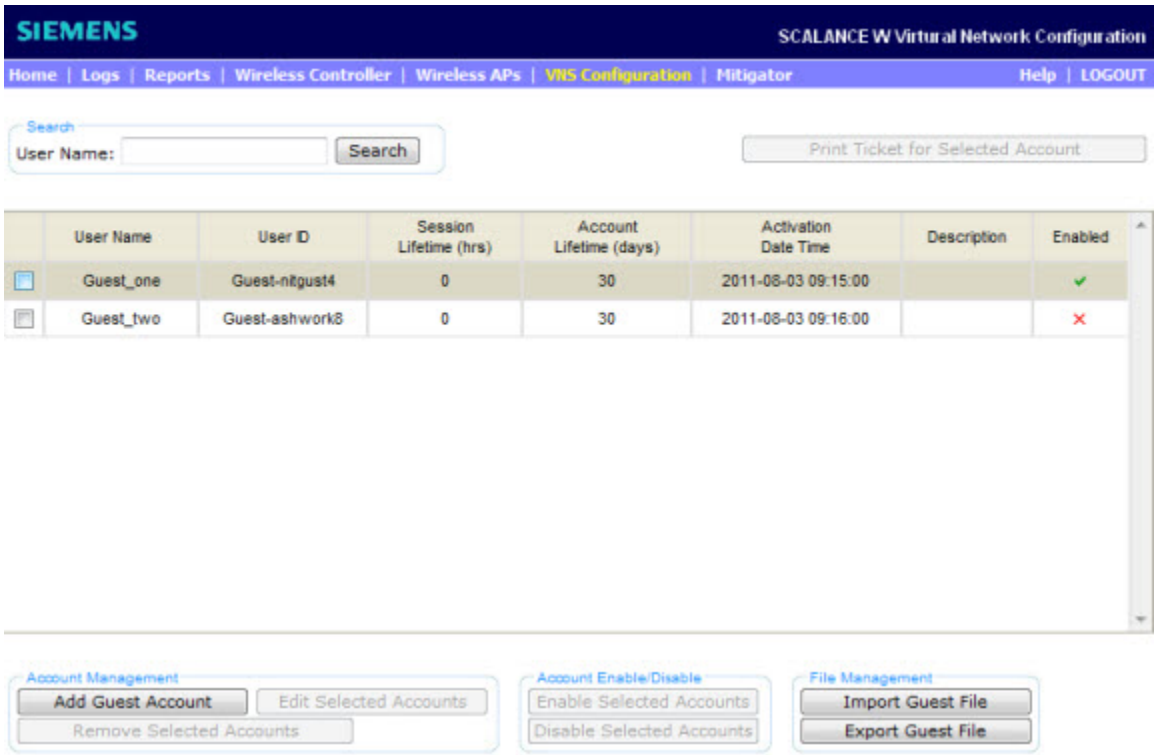
Editing Guest Accounts

An already existing guest account can be edited.

To Edit a Guest Account:

1. Do one of the following:
   - If you have GuestPortal Manager rights, log onto the SCALANCE IWLAN Controller.
   - If you have full administrator rights:
     (1) From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
     (2) In the left pane, expand the **WLAN Services** pane, click the dedicated WLAN Service that provides the temporary guest network services. The **WLAN Services** configuration window for that service displays.
     (3) Click the **Auth & Acct** tab, and then click **Configure**. The **Settings** screen is displayed.
     (4) In the **GuestPortal** section, click **Manage Guest Users**.

   The **GuestPortal Guest Administration** screen is displayed.



2. In the guest account list, select the checkbox next to the user name of the guest account that you want to edit.
3. In the **Account Management** section, click **Edit Selected Accounts**. The **Edit Guest User** screen is displayed.
4. Edit the guest account accordingly. For more information on guest account properties, see "Adding New Guest Accounts" on page 19-2.
5. To save your changes, click **OK**. A confirmation message is displayed in the **GuestPortal Guest Administration** screen footer.

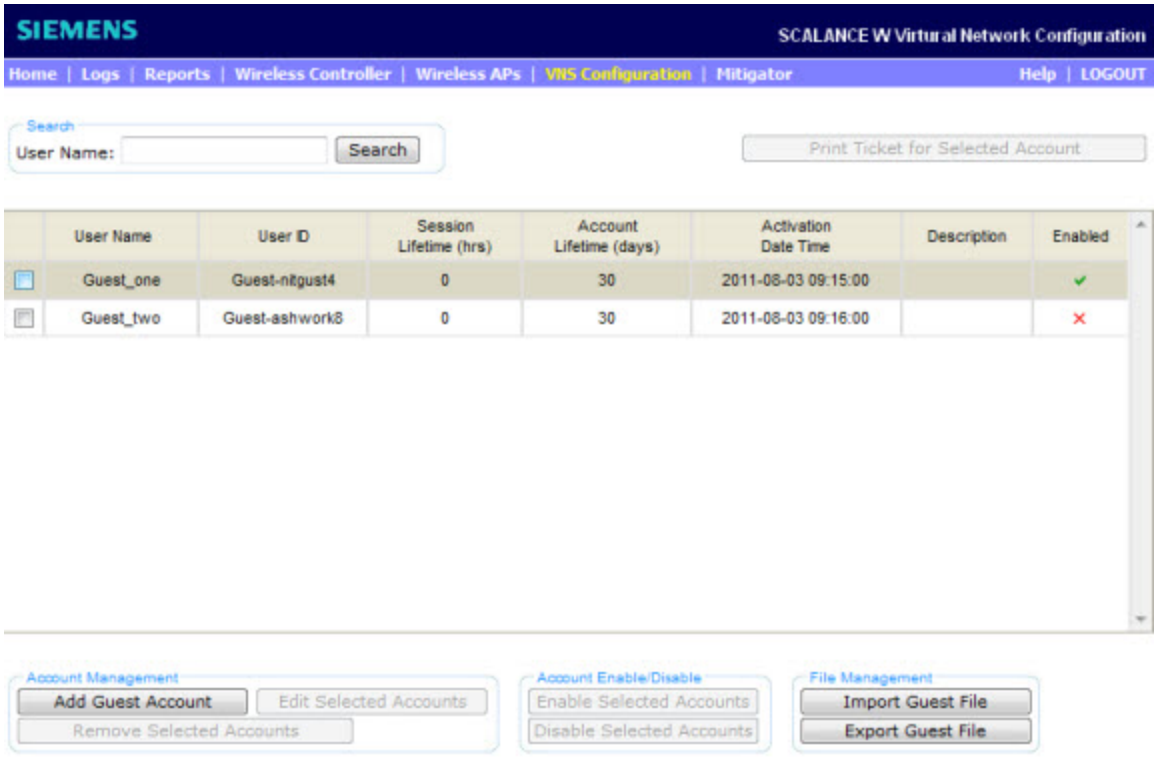
Removing Guest Accounts

An already existing guest account can be removed from the database.

To Remove a Guest Account:

1. Do one of the following:
   - If you have GuestPortal Manager rights, log onto the SCALANCE IWLAN Controller.
   - If you have full administrator rights:
     (1) From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
     (2) In the left pane, expand the **WLAN Services** pane, click the dedicated WLAN Service that provides the temporary guest network services. The **WLAN Services** configuration window for that service displays.
     (3) Click the **Auth & Acct** tab, and then click **Configure**. The **Settings** screen is displayed.
     (4) In the **GuestPortal** section, click **Manage Guest Users**.

The **GuestPortal Guest Administration** screen is displayed.



2. In the guest account list, select the checkbox next to the user name of the guest account that you want to remove.
3. In the **Account Management** section, click **Remove Selected Accounts**. A dialog is displayed requesting you to confirm your removal.
4. Click **OK**. A confirmation message is displayed in the **GuestPortal Guest Administration** screen footer.

Importing and Exporting a Guest File

To help administrators manage large numbers of guest accounts, you can import and export .csv (comma separated value) guest files for the SCALANCE IWLAN Controller.

The following describes the column values of the .csv guest file.

Table 19-1 Guest Account Import and Export .csv File Values

Column	Value
A	User ID
B	User name
C	Password
D	Description
E	Account activation date

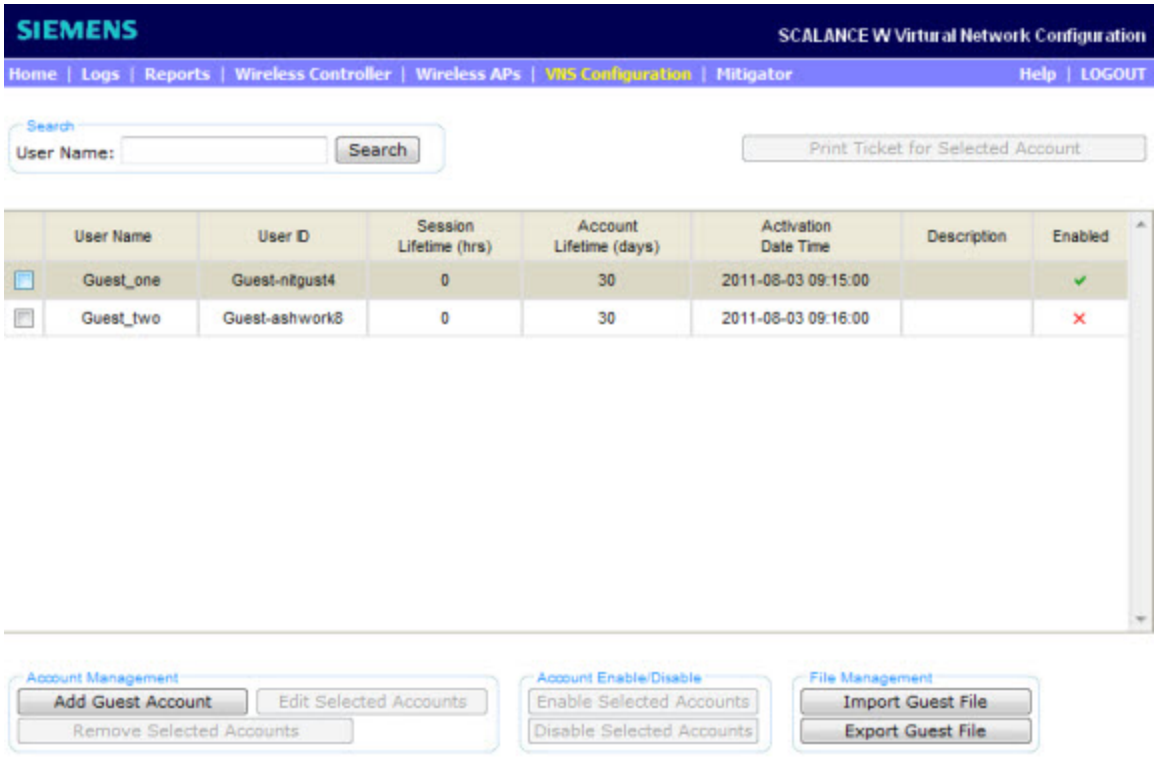
Table 19-1 Guest Account Import and Export .csv File Values (continued)

Column	Value
F	Account lifetime, measured in days
G	Session lifetime, measured in hours
H	Is the account enabled (1) or disabled (0)
I	Time of day, start time
J	Time of day, duration
K	Total time of the session lifetime that has been used, measured in minutes
L	Is the guest user account synchronized on a secondary SCALANCE IWLAN Controller in an availability pair, yes (1) no (0)

To Export a Guest File

1. Do one of the following:
   - If you have GuestPortal Manager rights, log onto the SCALANCE IWLAN Controller.
   - If you have full administrator rights:
     (1) From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
     (2) In the left pane, expand the **WLAN Services** pane, click the dedicated WLAN Service that provides the temporary guest network services. The **WLAN Services** configuration window for that service displays.
     (3) Click the **Auth & Acct** tab, and then click **Configure**. The **Settings** screen is displayed.
     (4) In the **GuestPortal** section, click **Manage Guest Users**.

The **GuestPortal Guest Administration** screen is displayed.

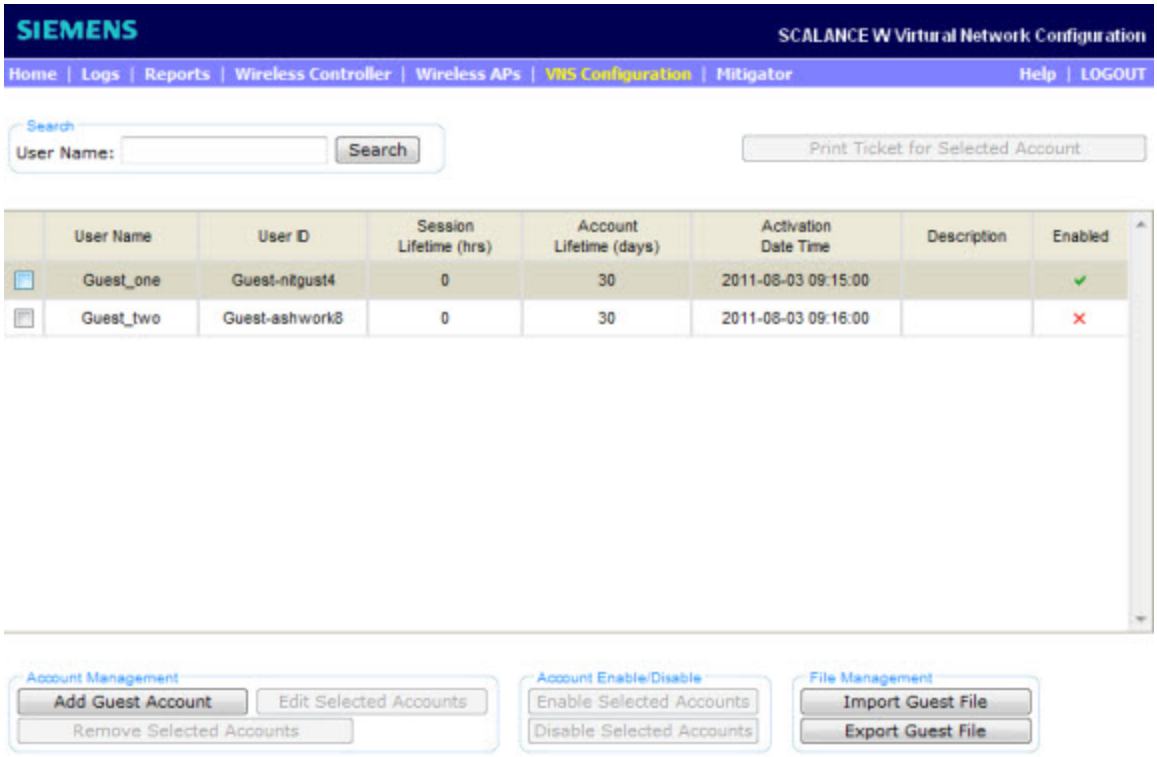


2. In the **File Management** section, click **Export Guest File**. A **File Download** dialog is displayed.
3. Click **Save**. The **Save As** dialog is displayed.
4. Name the guest file, and then navigate to the location where you want to save the file. By default, the exported guest file is named **exportguest.csv**.
5. Click **Save**. The **File Download** dialog is displayed as the file is exported.
6. Click **Close**. A confirmation message is displayed in the **GuestPortal Guest Administration** screen footer.

To Import a Guest File

1. Do one of the following:
   - If you have GuestPortal Manager rights, log onto the SCALANCE IWLAN Controller.
   - If you have full administrator rights:
     (1) From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
     (2) In the left pane, expand the **WLAN Services** pane, click the dedicated WLAN Service that provides the temporary guest network services. The **WLAN Services** configuration window for that service displays.
     (3) Click the **Auth & Acct** tab, and then click **Configure**. The **Settings** screen is displayed.
     (4) In the **GuestPortal** section, click **Manage Guest Users**.

The **GuestPortal Guest Administration** screen is displayed.



2. In the **File Management** section, click **Import Guest File**. The **Import Guest File** dialog is displayed.
3. Click **Browse** to navigate to the location of the .csv guest file that you want to import, and then click **Open**.
4. Click **Import**. The file is imported and a confirmation message is displayed in the **Import Guest File** dialog.
5. Click **Close**.

Viewing and Printing a GuestPortal Account Ticket

You can view and print a GuestPortal account ticket from the **GuestPortal Guest Administration** screen. A GuestPortal account ticket is a print-ready form that displays the guest account information, system requirements, and instructions on how to log on to the guest account.

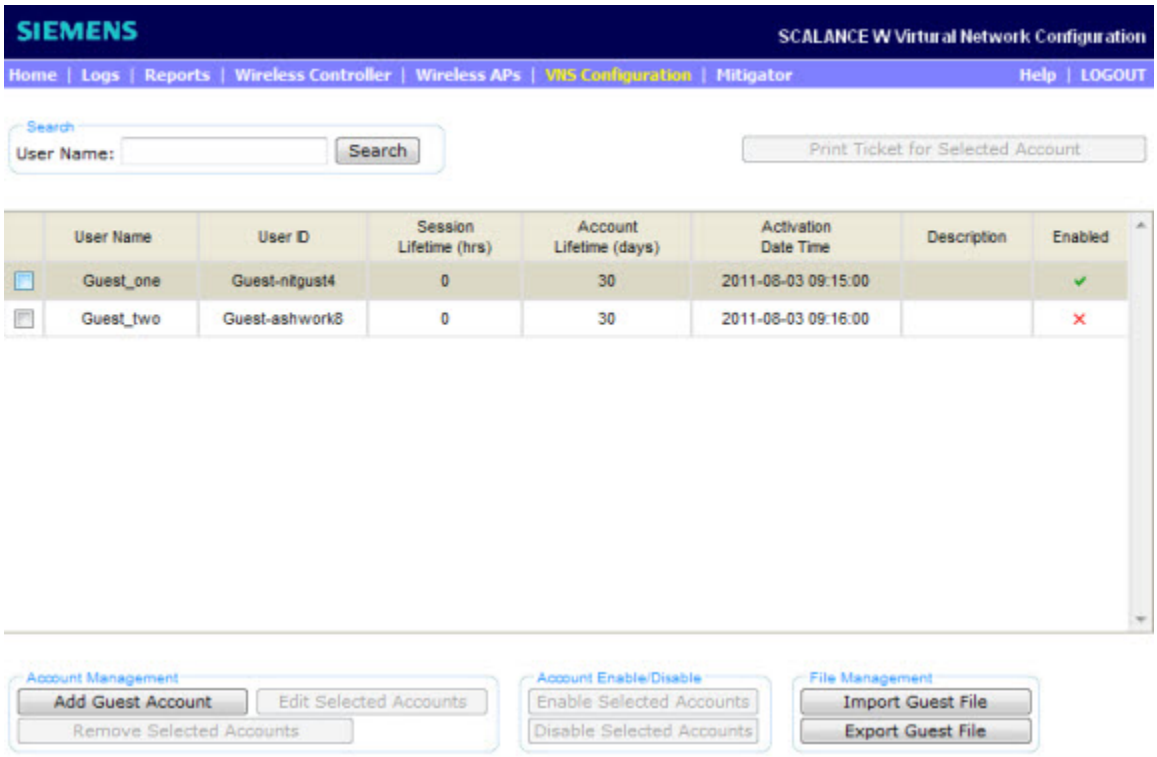
The SCALANCE IWLAN Controller is shipped with a default template for the GuestPortal account ticket. The template is an html page that is augmented with system placeholders that display information about the user.

You can also upload a custom GuestPortal ticket template for the SCALANCE IWLAN Controller. To upload a custom GuestPortal ticket template you need full administrator access rights on the SCALANCE IWLAN Controller. The filename of a custom GuestPortal ticket template must be .html. For more information, see “Working with the GuestPortal Ticket Page” on page 19-12.

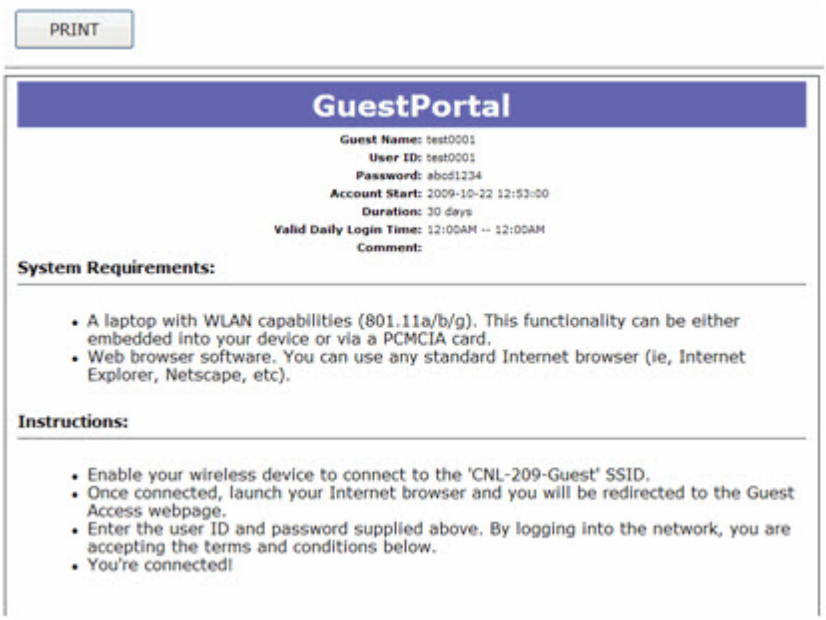
To View Print a GuestPortal Account Ticket:

1. Do one of the following:
   - If you have GuestPortal Manager rights, log onto the SCALANCE IWLAN Controller.
   - If you have full administrator rights:
     (1) From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
     (2) In the left pane, expand the **WLAN Services** pane, click the dedicated WLAN Service that provides the temporary guest network services. The **WLAN Services** configuration window for that service displays.
     (3) Click the **Auth & Acct** tab, and then click **Configure**. The **Settings** screen is displayed.
     (4) In the **GuestPortal** section, click **Manage Guest Users**.

   The **GuestPortal Guest Administration** screen is displayed.



2. In the guest account list, select the checkbox next to the user name whose guest account ticket you want to print a ticket, and then click **Print Ticket for Selected Account**. The **GuestPortal** ticket is displayed.


PRINT
GuestPortal
Guest Name: test0001
User ID: test0001
Password: abcd1234
Account Start: 2009-10-22 12:53:00
Duration: 30 days
Valid Daily Login Time: 12:00AM -- 12:00AM
Comment:
System Requirements:
A laptop with WLAN capabilities (801.11a/b/g). This functionality can be either embedded into your device or via a PCMCIA card.
Web browser software. You can use any standard Internet browser (ie, Internet Explorer, Netscape, etc).
Instructions:
Enable your wireless device to connect to the 'CNL-209-Guest' SSID.
Once connected, launch your Internet browser and you will be redirected to the Guest Access webpage.
Enter the user ID and password supplied above. By logging into the network, you are accepting the terms and conditions below.
You're connected!

3. Click **Print**. The **Print** dialog is displayed.
4. Click **Print**.

Note:
The default GuestPortal ticket page uses placeholder tags. For more information, see Appendix B, **Default GuestPortal Source Code**.

Working with the GuestPortal Ticket Page

Working with the GuestPortal ticket page can include activating a GuestPortal ticket page, uploading a customized GuestPortal ticket page to the SCALANCE IWLAN Controller, and deleting a customized GuestPortal ticket page.

Note:
The default GuestPortal ticket page cannot be deleted.

To work with the GuestPortal account ticket page, you need full administrator rights. You can work with the guest account ticket page from the **Settings** screen. A guest account ticket is a print-ready form that displays the guest account information, system requirements, and instructions on how to log on to the guest account.

Working with a Custom GuestPortal Ticket Page

A customized GuestPortal ticket page can be uploaded to the SCALANCE IWLAN Controller. When designing your customized GuestPortal ticket page, be sure to use the guest account information placeholder tags that are depicted in the default GuestPortal ticket page. For more information, see Appendix B, **Default GuestPortal Source Code**.

Activating a GuestPortal Ticket Page

To Activate a GuestPortal Ticket Page:

1. From the top menu, click **VNS Configuration**. The **Virtual Network Configuration** screen is displayed.
2. In the left pane, expand the **WLAN Services** pane, click the dedicated WLAN Service that provides the temporary guest network services. The **WLAN Services** configuration window for that service displays.
3. Click the **Auth & Acct** tab, and then click **Configure**. The **Settings** screen is displayed.
4. In the **GuestPortal** section, click **Configure Ticket Page**. The **Ticket Settings** dialog is displayed.
5. In the **Active Template** list, click the GuestPortal ticket page you want to activate, and then click **Apply**.

   This list includes all GuestPortal ticket pages that have been uploaded to the SCALANCE IWLAN Controller.

Uploading a Custom GuestPortal Ticket Page

To Upload a Custom GuestPortal Ticket Page:

1. On the **Ticket Settings** dialog, click **Browse**. The **Choose file** dialog is displayed.
2. Navigate to the .html GuestPortal ticket page file that you want to upload to the SCALANCE IWLAN Controller, and then click **Open**. The file name is displayed in the **Upload Template** box.
3. Click **Apply**. The file is uploaded to the SCALANCE IWLAN Controller.

   The **Active Template** list includes all GuestPortal ticket pages that have been uploaded to the SCALANCE IWLAN Controller.

Deleting a Custom GuestPortal Ticket Page

To Delete a Custom GuestPortal Ticket Page:

1. On the **Ticket Settings** dialog, in the **Active Template** list, click the GuestPortal ticket page you want to delete, and then click **Delete**. A dialog prompts you to confirm you want to delete the GuestPortal ticket page.
2. To delete the file, click **OK**, and then click **Apply**.,

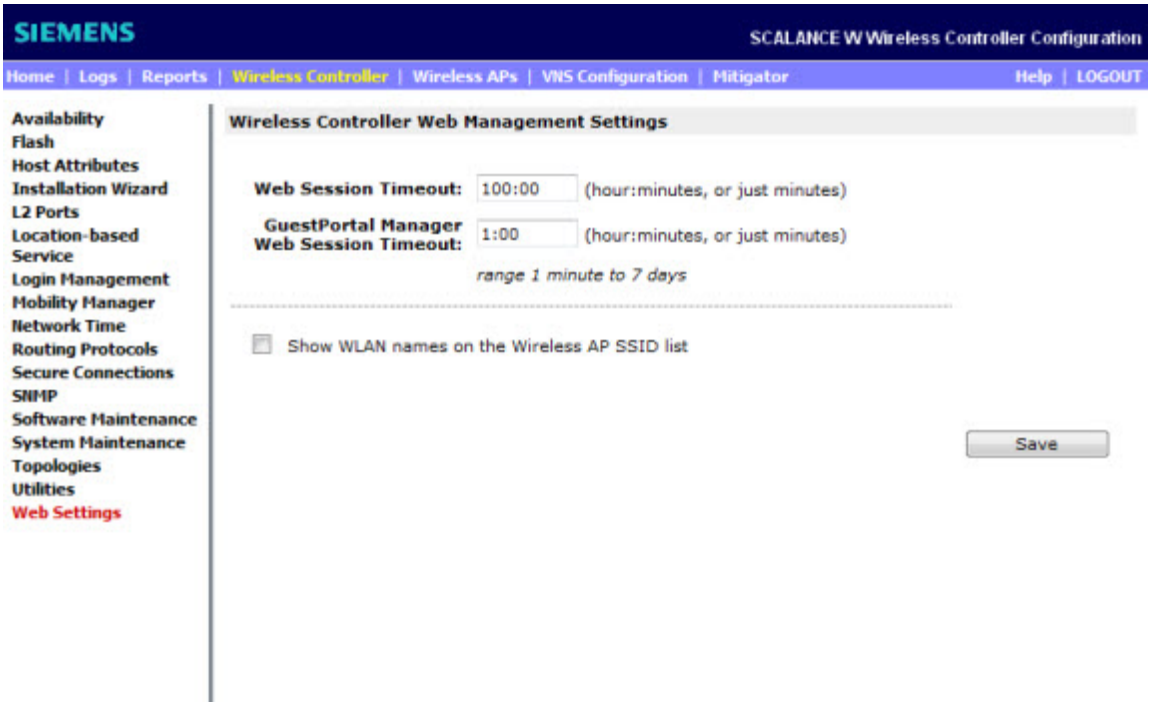
Configuring Web Session Timeouts

You can configure the time period to allow Web sessions to remain inactive before timing out.

To Configure Web Session Timeouts:

1. From the top menu, click **Wireless Controller**. The **Wireless Controller Configuration** screen is displayed.

2. In the left pane, click **Web Settings** The **Wireless Controller Web Management Settings** screen is displayed.



3. In the **Web Session Timeout** box, type the time period to allow the Web session to remain inactive before it times out. This can be entered as hour:minutes, or as minutes. The range is 1 minute to 168 hours.
4. In the **GuestPortal Manager Web Session Timeout** box, type the time period to allow the GuestPortal Web session to remain inactive before it times out. This can be entered as hour:minutes, or as minutes. The range is 1 minute to 168 hours.
5. Select the **Show WLAN names on the Wireless AP SSID list** checkbox to allow the names of the WLAN services to appear in the SSID list for Wireless APs.
6. To save your settings, click **Save**.

Note:
Screens that auto-refresh will time-out unless a manual action takes place prior to the end of the timeout period.

A

Glossary

For information about...	Refer to page...
Networking Terms and Abbreviations	A-1
Wireless Controller Terms and Abbreviations	A-15

Networking Terms and Abbreviations

Table A-1 Networking Terms and Abbreviations

Term	Explanation
AAA	Authentication, Authorization and Accounting. A system in IP-based networking to control what computer resources users have access to and to keep track of the activity of users over a network.
Access Point (AP)	A wireless LAN transceiver or ‘base station’ that can connect a wired LAN to one or many wireless devices.
Ad-hoc mode	An 802.11 networking framework in which devices or stations communicate directly with each other, without the use of an access point (AP). (Compare Infrastructure Mode)
AES	Advanced Encryption Standard (AES) is an algorithm for encryption that works at multiple network layers simultaneously. As a block cipher, AES encrypts data in fixed-size blocks of 128 bits. AES was created by the National Institute of Standards and Technology (NIST). AES is a privacy transform for IPSec and Internet Key Exchange (IKE). AES has a variable key length - the algorithm can specify a 128-bit key (the default), a 192-bit key, or a 256-bit key. For the WPA2/802.11i implementation of AES, a 128 bit key length is used. AES encryption includes 4 stages that make up one round. Each round is then iterated 10, 12 or 14 times depending upon the bit-key size. For the WPA2/802.11i implementation of AES, each round is iterated 10 times.
AES-CCMP	AES uses the Counter-Mode/CBC-MAC Protocol (CCMP). CCM is a new mode of operation for a block cipher that enables a single key to be used for both encryption and authentication. The two underlying modes employed in CCM include Counter mode (CTR) that achieves data encryption and Cipher Block Chaining Message Authentication Code (CBC-MAC) to provide data integrity.
ARP	Address Resolution Protocol. A protocol used to obtain the physical addresses (such as MAC addresses) of hardware units in a network environment. A host obtains such a physical address by broadcasting an ARP request, which contains the IP address of the target hardware unit. If the request finds a unit with that IP address, the unit replies with its physical hardware address.
Association	A connection between a wireless device and an Access Point.

Table A-1 Networking Terms and Abbreviations (continued)

Term	Explanation
asynchronous	Asynchronous transmission mode (ATM). A start/stop transmission in which each character is preceded by a start signal and followed by one or more stop signals. A variable time interval can exist between characters. ATM is the preferred technology for the transfer of images.
BSS	Basic Service Set. A wireless topology consisting of one Access Point connected to a wired network and a set of wireless devices. Also called an infrastructure network. *See also* IBSS.
Captive Portal	A browser-based authentication mechanism that forces unauthenticated users to a Web page. Sometimes called a 'reverse firewall'.
CDR	Call Data (Detail) Record In Internet telephony, a call detail record is a data record that contains information related to a telephone call, such as the origination and destination addresses of the call, the time the call started and ended, the duration of the call, the time of day the call was made and any toll charges that were added through the network or charges for operator services, among other details of the call. In essence, call accounting is a database application that processes call data from your switch (PBX, iPBX, or key system) via a CDR (call detail record) or SMDR (station message detail record) port. The call data record details your system's incoming and outgoing calls by thresholds, including time of call, duration of call, dialing extension, and number dialed. Call data is stored in a PC database
CHAP	Challenge-Handshake Authentication Protocol. One of the two main authentication protocols used to verify a user's name and password for PPP Internet connections. CHAP is more secure than PAP because it performs a three-way handshake during the initial link establishment between the home and remote machines. It can also repeat the authentication anytime after the link has been established.
CLI	Command Line Interface.
Collision	Two Ethernet packets attempting to use the medium simultaneously. Ethernet is a shared media, so there are rules for sending packets of data to avoid conflicts and protect data integrity. When two nodes at different locations attempt to send data at the same time, a collision will result. Segmenting the network with bridges or switches is one way of reducing collisions in an overcrowded network.
Datagram	A datagram is "a self-contained, independent entity of data carrying sufficient information to be routed from the source to the destination computer without reliance on earlier exchanges between this source and destination computer and the transporting network." (RFC1594). The term has been generally replaced by the term packet. Datagrams or packets are the message units that the Internet Protocol deals with and that the Internet transports.
dBm	An abbreviation for the power ratio in decibels (dB) of the measured power referenced to one milliwatt.
Decapsulation	*See* tunnelling.
Device Server	A specialized, network-based hardware device designed to perform a single or specialized set of server functions. Print servers, terminal servers, remote access servers and network time servers are examples of device servers.

Table A-1 Networking Terms and Abbreviations (continued)

Term	Explanation
DHCP	Dynamic Host Configuration Protocol. A protocol for assigning dynamic IP addresses to devices on a network. With dynamic addressing, a device can have a different IP address every time it connects to the network. In some systems, the device's IP address can even change while it is still connected. DHCP also supports a mix of static and dynamic IP addresses. DHCP consists of two components: a protocol for delivering host-specific configuration parameters from a DHCP server to a host and a mechanism for allocation of network addresses to hosts. (IETF RFC1531.) Option 78 specifies the location of one or more SLP Directory Agents. Option 79 specifies the list of scopes that a SLP Agent is configured to use.(RFC2610 - DHCP Options for Service Location Protocol)
Directory Agent (DA)	A method of organizing and locating the resources (such as printers, disk drives, databases, e-mail directories, and schedulers) in a network. Using SLP, networking applications can discover the existence, location and configuration of networked devices. With Service Location Protocol, client applications are 'User Agents' and services are advertised by 'Service Agents'. The User Agent issues a multicast 'Service Request' (SrvRqst) on behalf of the client application, specifying the services required. The User Agent will receive a Service Reply (SrvRply) specifying the location of all services in the network which satisfy the request. For larger networks, a third entity, called a 'Directory Agent', receives registrations from all available Service Agents. A User Agent sends a unicast request for services to a Directory Agent (if there is one) rather than to a Service Agent. (SLP version 2, RFC2608, updating RFC2165)
Diversity antenna and receiver	The AP has two antennae. Receive diversity refers to the ability of the AP to provide better service to a device by receiving from the user on which ever of the two antennae is receiving the cleanest signal. Transmit diversity refers to the ability of the AP to use its two antenna to transmit on a specific antenna only, or on a alternate antennae. The antennae are called diversity antennae because of this capability of the pair.
DNS	Domain Name Server
DSSS	Direct-Sequence Spread Spectrum. A transmission technology used in Local Area Wireless Network (LAWN) transmissions where a data signal at the sending station is combined with a higher data rate bit sequence, or chipping code, that divides the user data according to a spreading ratio. The chipping code is a redundant bit pattern for each bit that is transmitted, which increases the signal's resistance to interference. If one or more bits in the pattern are damaged during transmission, the original data can be recovered due to the redundancy of the transmission. (Compare FHSS)
DTIM	DTIM delivery traffic indication message (in 802.11 standard)
Dynamic WEP	The IEEE introduced the concept of user-based authentication using per-user encryption keys to solve the scalability issues that surrounded static WEP. This resulted in the 802.1x standard, which makes use of the IETF's Extensible Authentication Protocol (EAP), which was originally designed for user authentication in dial-up networks. The 802.1x standard supplemented the EAP protocol with a mechanism to send an encryption key to a Wireless AP. These encryption keys are used as dynamic WEP keys, allowing traffic to each individual user to be encrypted using a separate key.

Table A-1 Networking Terms and Abbreviations (continued)

Term	Explanation
EAP-TLS EAP-TTLS	EAP-TLS Extensible Authentication Protocol - Transport Layer Security. A general protocol for authentication that also supports multiple authentication methods, such as token cards, Kerberos, one-time passwords, certificates, public key authentication and smart cards. IEEE 802.1x specifies how EAP should be encapsulated in LAN frames. In wireless communications using EAP, a user requests connection to a WLAN through an access point, which then requests the identity of the user and transmits that identity to an authentication server such as RADIUS. The server asks the access point for proof of identity, which the access point gets from the user and then sends back to the server to complete the authentication. EAP-TLS provides for certificate-based and mutual authentication of the client and the network. It relies on client-side and server-side certificates to perform authentication and can be used to dynamically generate user-based and session-based WEP keys. EAP-TTLS (Tunneled Transport Layer Security) is an extension of EAP-TLS to provide certificate-based, mutual authentication of the client and network through an encrypted tunnel, as well as to generate dynamic, per-user, per-session WEP keys. Unlike EAP-TLS, EAP-TTLS requires only server-side certificates. (*See also* PEAP)
Encapsulation	*See* tunnelling.
ESS	Extended Service Set (ESS). Several Basic Service Sets (BSSs) can be joined together to form one logical WLAN segment, referred to as an extended service set (ESS). The SSID is used to identify the ESS. (*See* BSS and SSID.)
FHSS	Frequency-Hopping Spread Spectrum. A transmission technology used in Local Area Wireless Network (LAWN) transmissions where the data signal is modulated with a narrowband carrier signal that ‘hops’ in a random but predictable sequence from frequency to frequency as a function of time over a wide band of frequencies. This technique reduces interference. If synchronized properly, a single logical channel is maintained. (Compare DSSS)
Fit, thin and fat APs	A thin AP architecture uses two components: an access point that is essentially a stripped-down radio and a centralized management controller that handles the other WLAN system functions. Wired network switches are also required. A fit AP, a variation of the thin AP, handles the RF and encryption, while the central management controller, aware of the wireless users' identities and locations, handles secure roaming, quality of service, and user authentication. The central management controller also handles AP configuration and management. A fat (or thick) AP architecture concentrates all the WLAN intelligence in the access point. The AP handles the radio frequency (RF) communication, as well as authenticating users, encrypting communications, secure roaming, WLAN management, and in some cases, network routing.
FQDN	Fully Qualified Domain Name. A ‘friendly’ designation of a computer, of the general form computer.[subnetwork.].organization.domain. The FQDN names must be translated into an IP address in order for the resource to be found on a network, usually performed by a Domain Name Server.
FTM	Forwarding Table Manager
FTP	File Transfer Protocol
Gateway	In the wireless world, an access point with additional software capabilities such as providing NAT and DHCP. Gateways may also provide VPN support, roaming, firewalls, various levels of security, etc.

Table A-1 Networking Terms and Abbreviations (continued)

Term	Explanation
Gigabit Ethernet	The high data rate of the Ethernet standard, supporting data rates of 1 gigabit (1,000 megabits) per second.
GUI	Graphical User Interface
Heartbeat message	A heartbeat message is a UDP data packet used to monitor a data connection, polling to see if the connection is still alive. In general terms, a heartbeat is a signal emitted at regular intervals by software to demonstrate that it is still alive. In networking, a heartbeat is the signal emitted by a Level 2 Ethernet transceiver at the end of every packet to show that the collision-detection circuit is still connected.
Host	(1) A computer (usually containing data) that is accessed by a user working on a remote terminal, connected by modems and telephone lines. (2) A computer that is connected to a TCP/IP network, including the Internet. Each host has a unique IP address.
HTTP	Hypertext Transfer Protocol is the set of rules for transferring files (text, graphic images, sound, video, and other multimedia files) on the World Wide Web. A Web browser makes use of HTTP. HTTP is an application protocol that runs on top of the TCP/IP suite of protocols. (RFC2616: Hypertext Transfer Protocol -- HTTP/1.1)
HTTPS	Hypertext Transfer Protocol over Secure Socket Layer, or HTTP over SSL, is a Web protocol that encrypts and decrypts user page requests as well as the pages that are returned by the Web server. HTTPS uses Secure Socket Layer (SSL) as a sublayer under its regular HTTP application layering. (HTTPS uses port 443 instead of HTTP port 80 in its interactions with the lower layer, TCP/IP.) SSL uses a 40-bit key size for the RC4 stream encryption algorithm, which is considered an adequate degree of encryption for commercial exchange.
IBSS	Independent Basic Service Set. *See* BSS. An IBSS is the 802.11 term for an adhoc network. *See* adhoc network.
ICMP	Internet Control Message Protocol, an extension to the Internet Protocol (IP) defined by RFC792. ICMP supports packets containing error, control, and informational messages. The PING command, for example, uses ICMP to test an Internet connection.
ICV	ICV (Integrity Check Value) is a 4-byte code appended in standard WEP to the 802.11 message. Enhanced WPA inserts an 8-byte MIC just before the ICV. (*See* WPA and MIC)
IE	Internet Explorer.
IEEE	Institute of Electrical and Electronics Engineers, a technical professional association, involved in standards activities.
IETF	Internet Engineering Task Force, the main standards organization for the Internet.
Infrastructure Mode	An 802.11 networking framework in which devices communicate with each other by first going through an Access Point (AP). In infrastructure mode, wireless devices can communicate with each other or can communicate with a wired network. (*See* ad-hoc mode and BSS.)
Internet or IP telephony	IP or Internet telephony are communications, such as voice, facsimile, voice-messaging applications, that are transported over the Internet, rather than the public switched telephone network (PSTN). IP telephony is the two-way transmission of audio over a packet-switched IP network (TCP/IP network). An Internet telephone call has two steps: (1) converting the analog voice signal to digital format, (2) translating the signal into Internet protocol (IP) packets for transmission over the Internet. At the receiving end, the steps are reversed. Over the public Internet, voice quality varies considerably. Protocols that support Quality of Service (QoS) are being implemented to improve this.

Table A-1 Networking Terms and Abbreviations (continued)

Term	Explanation
IP	Internet Protocol is the method or protocol by which data is sent from one computer to another on the Internet. Each computer (host) on the Internet has at least one IP address that uniquely identifies it. Internet Protocol specifies the format of packets, also called datagrams, and the addressing scheme. Most networks combine IP with a higher-level protocol called Transmission Control Protocol (TCP), which establishes a virtual connection between a destination and a source.
IPC	Interprocess Communication. A capability supported by some operating systems that allows one process to communicate with another process. The processes can be running on the same computer or on different computers connected through a network.
IPsec IPsec-ESP IPsec-AH	Internet Protocol security (IPSec) Internet Protocol security Encapsulating Security Payload (IPsec-ESP). The encapsulating security payload (ESP) encapsulates its data, enabling it to protect data that follows in the datagram.Internet Protocol security Authentication Header (IPsec-AH). AH protects the parts of the IP datagram that can be predicted by the sender as it will be received by the receiver.IPsec is a set of protocols developed by the IETF to support secure exchange of packets at the IP layer. IPsec has been deployed widely to implement Virtual Private Networks (VPNs). IPsec supports two encryption modes: Transport and Tunnel. Transport mode encrypts only the data portion (payload) of each packet, but leaves the header untouched. The more secure Tunnel mode encrypts both the header and the payload. On the receiving side, an IPSec-compliant device decrypts each packet. For IPsec to work, the sending and receiving devices must share a public key. This is accomplished through a protocol known as Internet Security Association and Key Management Protocol/Oakley (ISAKMP/Oakley), which allows the receiver to obtain a public key and authenticate the sender using digital certificates.
isochronous	Isochronous data is data (such as voice or video) that requires a constant transmission rate, where data must be delivered within certain time constraints. For example, multimedia streams require an isochronous transport mechanism to ensure that data is delivered as fast as it is displayed and to ensure that the audio is synchronized with the video. Compare: asynchronous processes in which data streams can be broken by random intervals, and synchronous processes, in which data streams can be delivered only at specific intervals.
ISP	Internet Service Provider.
IV	IV (Initialization Vector), part of the standard WEP encryption mechanism that concatenates a shared secret key with a randomly generated 24-bit initialization vector. WPA with TKIP uses 48-bit IVs, an enhancement that significantly increases the difficulty in cracking the encryption. (*See* WPA and TKIP)
LAN	Local Area Network.
LSA	Link State Advertisements received by the currently running OSPF process. The LSAs describe the local state of a router or network, including the state of the router's interfaces and adjacencies. *See* also OSPF.
MAC	Media Access Control layer. One of two sublayers that make up the Data Link Layer of the OSI model. The MAC layer is responsible for moving data packets to and from one Network Interface Card (NIC) to another across a shared channel.
MAC address	Media Access Control address. A hardware address that uniquely identifies each node of a network.

Table A-1 Networking Terms and Abbreviations (continued)

Term	Explanation
MIB	Management Information Base is a formal description of a set of network objects that can be managed using the Simple Network Management Protocol (SNMP). The format of the MIB is defined as part of the SNMP. A MIB is a collection of definitions defining the properties of a managed object within a device. Every managed device keeps a database of values for each of the definitions written in the MIB. Definition of the MIB conforms to RFC1155 (Structure of Management Information).
MIC	Message Integrity Check or Code (MIC), also called 'Michael', is part of WPA and TKIP. The MIC is an additional 8-byte code inserted before the standard 4-byte integrity check value (ICV) that is appended in by standard WEP to the 802.11 message. This greatly increases the difficulty in carrying out forgery attacks. Both integrity check mechanisms are calculated by the receiver and compared against the values sent by the sender in the frame. If the values match, there is assurance that the message has not been tampered with. (*See* WPA, TKIP and ICV).
MTU	Maximum Transmission Unit. The largest packet size, measured in bytes, that a network interface is configured to accept. Any messages larger than the MTU are divided into smaller packets before being sent.
MU	Mobile Unit, a wireless device such as a PC laptop.
multicast, broadcast, unicast	Multicast: transmitting a single message to a select group of recipients. Broadcast: sending a message to everyone connected to a network. Unicast: communication over a network between a single sender and a single receiver.
NAS	Network Access Server, a server responsible for passing information to designated RADIUS servers and then acting on the response returned. A NAS-Identifier is a RADIUS attribute identifying the NAS server. (RFC2138)
NAT	Network Address Translator. A network capability that enables a group of computers to dynamically share a single incoming IP address. NAT takes the single incoming IP address and creates new IP address for each client computer on the network.
Netmask	In administering Internet sites, a netmask is a string of 0's and 1's that mask or screen out the network part of an IP address, so that only the host computer part of the address remains. A frequently-used netmask is 255.255.255.0, used for a Class C subnet (one with up to 255 host computers). The ".0" in the "255.255.255.0" netmask allows the specific host computer address to be visible.
NIC	Network Interface Card. An expansion board in a computer that connects the computer to a network.
NMS	Network Management System. The system responsible for managing a network or a portion of a network. The NMS talks to network management agents, which reside in the managed nodes.
NTP	Network Time Protocol, an Internet standard protocol (built on top of TCP/IP) that assures accurate synchronization to the millisecond of computer clock times in a network of computers. Based on UTC, NTP synchronizes client workstation clocks to the U.S. Naval Observatory Master Clocks in Washington, DC and Colorado Springs CO. Running as a continuous background client program on a computer, NTP sends periodic time requests to servers, obtaining server time stamps and using them to adjust the client's clock. (RFC1305)

Table A-1 Networking Terms and Abbreviations (continued)

Term	Explanation
OFDM	Orthogonal frequency division multiplexing, a method of digital modulation in which a signal is split into several narrowband channels at different frequencies. OFDM is similar to conventional frequency division multiplexing (FDM). The difference lies in the way in which the signals are modulated and demodulated. Priority is given to minimizing the interference, or crosstalk, among the channels and symbols comprising the data stream. Less importance is placed on perfecting individual channels. OFDM is used in European digital audio broadcast services. It is also used in wireless local area networks.
OID	Object Identifier.
OS	Operating system.
OSI	Open System Interconnection. An ISO standard for worldwide communications that defines a networking framework for implementing protocols in seven layers. Control is passed from one layer to the next, starting at the application layer in one station, down through the presentation, session, transport, network, data link layer to the physical layer at the bottom, over the channel to the next station and back up the hierarchy.
OSI Layer 2	At the Data Link layer (OSI Layer 2), data packets are encoded and decoded into bits. The data link layer has two sublayers: • the Logical Link Control (LLC) layer controls frame synchronization, flow control and error checking • The Media Access Control (MAC) layer controls how a computer on the network gains access to the data and permission to transmit it.
OSI Layer 3	The Network layer (OSI Layer 3) provides switching and routing technologies, creating logical paths, known as virtual circuits, for transmitting data from node to node. Routing and forwarding are functions of this layer, as well as addressing, internetworking, error handling, congestion control and packet sequencing.
OSPF	Open Shortest Path First, an interior gateway routing protocol developed for IP networks based on the shortest path first or link-state algorithm. Routers use link-state algorithms to send routing information to all nodes in an internetwork by calculating the shortest path to each node based on a topography of the Internet constructed by each node. Each router sends that portion of the routing table (keeps track of routes to particular network destinations) that describes the state of its own links, and it also sends the complete routing structure (topography). Using OSPF, a host that obtains a change to a routing table or detects a change in the network immediately multicasts the information to all other hosts in the network so that all will have the same routing table information. The host using OSPF sends only the part that has changed, and only when a change has taken place. (RFC2328)
OUI	Organizationally Unique Identifier (used in MAC addressing).
Packet	The unit of data that is routed between an origin and a destination on the Internet or any other packet-switched network. When any file is sent from one place to another on the Internet, the Transmission Control Protocol (TCP) layer of TCP/IP divides the file into packets. Each packet is separately numbered and includes the Internet address of the destination. The individual packets for a given file may travel different routes through the Internet. When they have all arrived, they are reassembled into the original file (by the TCP layer at the receiving end).
PAP	Password Authentication Protocol is the most basic form of authentication, in which a user's name and password are transmitted over a network and compared to a table of name-password pairs. Typically, the passwords stored in the table are encrypted. (*See* CHAP).

Table A-1 Networking Terms and Abbreviations (continued)

Term	Explanation
PDU	Protocol Data Unit. A data object exchanged by protocol machines (such as management stations, SMUX peers, and SNMP agents) and consisting of both protocol control information and user data. PDU is sometimes used as a synonym for “packet''.
PEAP	PEAP (Protected Extensible Authentication Protocol) is an IETF draft standard to authenticate wireless LAN clients without requiring them to have certificates. In PEAP authentication, first the user authenticates the authentication server, then the authentication server authenticates the user. If the first phase is successful, the user is then authenticated over the SSL tunnel created in phase one using EAP-Generic Token Card (EAP-GTC) or Microsoft Challenged Handshake Protocol Version 2 (MSCHAP V2). (*See* also EAP-TLS).
PHP server	Hypertext Preprocessor
PKI	Public Key Infrastructure
PoE	Power over Ethernet. The Power over Ethernet standard (802.3af) defines how power can be provided to network devices over existing Ethernet connection, eliminating the need for additional external power supplies.
POST	Power On Self Test, a diagnostic testing sequence performed by a computer to determine if its hardware elements are present and powered on. If so, the computer begins its boot sequence.
push-to-talk (PTT)	The push-to-talk (PTT) is feature on wireless telephones that allows them to operate like a walkie-talkie in a group, instead of standard telephone operation. The PTT feature requires that the network be configured to allow multicast traffic. A PTT call is initiated by selecting a channel and pressing the ‘talk’ key on the wireless telephone. All wireless telephones on the same network that are monitoring the channel will hear the transmission. On a PTT call you hold the button to talk and release it to listen.
QoS	Quality of Service. A term for a number of techniques that intelligently match the needs of specific applications to the network resources available, using such technologies as Frame Relay, Asynchronous Transfer Mode (ATM), Ethernet and 802.1 networks, SONET, and IP-routed networks. QoS features provide better network service by supporting dedicated bandwidth, improving loss characteristics, avoiding and managing network congestion, shaping network traffic, setting traffic priorities across the network. Quality-of-Service (QoS): A set of service requirements to be met by the network while transporting a flow. (RFC2386)
RADIUS	Remote Authentication Dial-In User Service. An authentication and accounting system that checks User Name and Password and authorizes access to a network. The RADIUS specification is maintained by a working group of the IETF (RFC2865 RADIUS, RFC2866 RADIUS Accounting, RFC2868 RADIUS Attributes for Tunnel Protocol Support).
RF	Radio Frequency, a frequency in the electromagnetic spectrum associated with radio wave propagation. When an RF current is supplied to an antenna, an electromagnetic field is created that can propagate through space. These frequencies in the electromagnetic spectrum range from Ultra-low frequency (ULF) -- 0-3 Hz to Extremely high frequency (EHF) -- 30GHz - 300 GHz. The middle ranges are: Low frequency (LF) -- 30 kHz - 300 kHz, Medium frequency (MF) -- 300 kHz - 3 MHz, High frequency (HF) -- 3MHz - 30 MHz, Very high frequency (VHF) -- 30 MHz - 300 MHz, Ultra-high frequency (UHF)-- 300MHz - 3 GHz.
RFC	Request for Comments, a series of notes about the Internet, submitted to the Internet Engineering Task Force (IETF) and designated by an RFC number, that may evolve into an Internet standard. The RFCs are catalogued and maintained on the IETF RFC website: www.ietf.org/rfc.html.

Table A-1 Networking Terms and Abbreviations (continued)

Term	Explanation
Roaming	In 802.11, roaming occurs when a wireless device (a station) moves from one Access Point to another (or BSS to another) in the same Extended Service Set (ESS) -identified by its SSID.
RP-SMA	Reverse Polarity-Subminiature version A, a type of connector used with wireless antennas
RSN	Robust Security Network. A new standard within IEEE 802.11 to provide security and privacy mechanisms. The RSN (and related TSN) both specify IEEE 802.1x authentication with Extensible Authentication Protocol (EAP).
RSSI	RSSI received signal strength indication (in 802.11 standard)
RTS / CTS	RTS request to send, CTS clear to send (in 802.11 standard)
Segment	In Ethernet networks, a section of a network that is bounded by bridges, routers or switches. Dividing a LAN segment into multiple smaller segments is one of the most common ways of increasing available bandwidth on the LAN.
SLP	Service Location Protocol. A method of organizing and locating the resources (such as printers, disk drives, databases, e-mail directories, and schedulers) in a network. Using SLP, networking applications can discover the existence, location and configuration of networked devices. With Service Location Protocol, client applications are 'User Agents' and services are advertised by 'Service Agents'. The User Agent issues a multicast 'Service Request' (SrvRqst) on behalf of the client application, specifying the services required. The User Agent will receive a Service Reply (SrvRply) specifying the location of all services in the network which satisfy the request. For larger networks, a third entity, called a 'Directory Agent', receives registrations from all available Service Agents. A User Agent sends a unicast request for services to a Directory Agent (if there is one) rather than to a Service Agent. (SLP version 2, RFC2608, updating RFC2165)
SMI	Structure of Management Information. A hierarchical tree structure for information that underlies Management Information Bases (MIBs), and is used by the SNMP protocol. Defined in RFC1155 and RFC1442 (SNMPv2).
SMT (802.11)	Station ManagemenT. The object class in the 802.11 MIB that provides the necessary support at the station to manage the processes in the station such that the station may work cooperatively as a part of an IEEE 802.11 network. The four branches of the 802.11 MIB are: • dot11smt - objects related to station management and local configuration • dot11mac - objects that report/configure on the status of various MAC parameters • dot11res - Objects that describe available resources • dot11phy - Objects that report on various physical items.
SNMP	Simple Network Management Protocol. A set of protocols for managing complex networks. SNMP works by sending messages, called protocol data units (PDUs), to different parts of a network. SNMP-compliant devices, called agents, store data about themselves in Management Information Bases (MIBs) and return this data to the SNMP requesters. SNMP includes a limited set of management commands and responses. The management system issues Get, GetNext and Set messages to retrieve single or multiple object variables or to establish the value of a single variable. The managed agent sends a Response message to complete the Get, GetNext or Set.
SNMP trap	An event notification sent by the SNMP managed agent to the management system to identify the occurrence of conditions (such as a threshold that exceeds a predetermined value).

Table A-1 Networking Terms and Abbreviations (continued)

Term	Explanation
SSH	Secure Shell, sometimes known as Secure Socket Shell, is a Unix-based command interface and protocol for securely getting access to a remote computer. SSH is a suite of three utilities - slogin, ssh, and scp - secure versions of the earlier UNIX utilities, rlogin, rsh, and rcp. With SSH commands, both ends of the client/server connection are authenticated using a digital certificate, and passwords are protected by being encrypted.
SSID	Service Set Identifier. A 32-character unique identifier attached to the header of packets sent over a Wireless LAN that acts as a password when a wireless device tries to connect to the Basic Service Set (BSS). Several BSSs can be joined together to form one logical WLAN segment, referred to as an extended service set (ESS). The SSID is used to identify the ESS. In 802.11 networks, each Access Point advertises its presence several times per second by broadcasting beacon frames that carry the ESS name (SSID). Stations discover APs by listening for beacons, or by sending probe frames to search for an AP with a desired SSID. When the station locates an appropriately-named Access Point, it sends an associate request frame containing the desired SSID. The AP replies with an associate response frame, also containing the SSID. Some APs can be configured to send a zero-length broadcast SSID in beacon frames instead of sending their actual SSID. The AP must return its actual SSID in the probe response.
SSL	Secure Sockets Layer. A protocol developed by Netscape for transmitting private documents via the Internet. SSL works by using a public key to encrypt data that's transferred over the SSL connection. URLs that require an SSL connection start with https: instead of http. SSL uses a program layer located between the Internet's Hypertext Transfer Protocol (HTTP) and Transport Control Protocol (TCP) layers. The ‘sockets’ part of the term refers to the sockets method of passing data back and forth between a client and a server program in a network or between program layers in the same computer. SSL uses the public-and-private key encryption system from RSA, which also includes the use of a digital certificate. SSL has recently been succeeded by Transport Layer Security (TLS), which is based on SSL.
Subnet mask	(*See* netmask)
Subnets	Portions of networks that share the same common address format. A subnet in a TCP/IP network uses the same first three sets of numbers (such as 198.63.45.xxx), leaving the fourth set to identify devices on the subnet. A subnet can be used to increase the bandwidth on the network by breaking the network up into segments.
SVP	SpectraLink Voice Protocol, a protocol developed by SpectraLink to be implemented on access points to facilitate voice prioritization over an 802.11 wireless LAN that will carry voice packets from SpectraLink wireless telephones.
Switch	In networks, a device that filters and forwards packets between LAN segments. Switches operate at the data link layer (layer 2) and sometimes the network layer (layer 3) of the OSI Reference Model and therefore support any packet protocol. LANs that use switches to join segments are called switched LANs or, in the case of Ethernet networks, switched Ethernet LANs.
syslog	A protocol used for the transmission of event notification messages across networks, originally developed on the University of California Berkeley Software Distribution (BSD) TCP/IP system implementations, and now embedded in many other operating systems and networked devices. A device generates a messages, a relay receives and forwards the messages, and a collector (a syslog server) receives the messages without relaying them. Syslog uses the user datagram protocol (UDP) as its underlying transport layer mechanism. The UDP port that has been assigned to syslog is 514. (RFC3164)

Table A-1 Networking Terms and Abbreviations (continued)

Term	Explanation
TCP / IP	Transmission Control Protocol. TCP, together with IP (Internet Protocol), is the basic communication language or protocol of the Internet. Transmission Control Protocol manages the assembling of a message or file into smaller packets that are transmitted over the Internet and received by a TCP layer that reassembles the packets into the original message. Internet Protocol handles the address part of each packet so that it gets to the right destination. TCP/IP uses the client/server model of communication in which a computer user (a client) requests and is provided a service (such as sending a Web page) by another computer (a server) in the network.
TFTP	Trivial File Transfer Protocol. An Internet software utility for transferring files that is simpler to use than the File Transfer Protocol (FTP) but less capable. It is used where user authentication and directory visibility are not required. TFTP uses the User Datagram Protocol (UDP) rather than the Transmission Control Protocol (TCP). TFTP is described formally in Request for Comments (RFC) 1350.
TKIP	Temporal Key Integrity Protocol (TKIP) is an enhancement to the WEP encryption technique that uses a set of algorithms that rotates the session keys. TKIPs' enhanced encryption includes a per-packet key mixing function, a message integrity check (MIC), an extended initialization vector (IV) with sequencing rules, and a re-keying mechanism. The encryption keys are changed (rekeyed) automatically and authenticated between devices after the rekey interval (either a specified period of time, or after a specified number of packets has been transmitted).
TLS	Transport Layer Security. (*See* EAP, Extensible Authentication Protocol)
ToS / DSCP	ToS (Type of Service) / DSCP (Diffserv Codepoint). The ToS/DSCP box contained in the IP header of a frame is used by applications to indicate the priority and Quality of Service (QoS) for each frame. The level of service is determined by a set of service parameters which provide a three way trade-off between low-delay, high-reliability, and high-throughput. The use of service parameters may increase the cost of service.
TSN	Transition Security Network. A subset of Robust Security Network (RSN), which provides an enhanced security solution for legacy hardware. The Wi-Fi Alliance has adopted a solution called Wireless Protected Access (WPA), based on TSN. RSN and TSN both specify IEEE 802.1x authentication with Extensible Authentication Protocol (EAP).
Tunnelling	Tunnelling (or encapsulation) is a technology that enables one network to send its data via another network's connections. Tunnelling works by encapsulating packets of a network protocol within packets carried by the second network. The receiving device then decapsulates the packets and forwards them in their original format.
UDP	User Datagram Protocol. A connectionless protocol that, like TCP, runs on top of IP networks. Unlike TCP/IP, UDP/IP provides very few error recovery services, offering instead a direct way to send and receive packets over an IP network. It is used primarily for broadcasting messages over a network.
U-NII	Unlicensed National Information Infrastructure. Designated to provide short-range, high-speed wireless networking communication at low cost, U-NII consists of three frequency bands of 100 MHz each in the 5 GHz band: 5.15-5.25GHz (for indoor use only), 5.25-5.35 GHz and 5.725-5.825GHz. The three frequency bands were set aside by the FCC in 1997 initially to help schools connect to the Internet without the need for hard wiring. U-NII devices do not require licensing.

Table A-1 Networking Terms and Abbreviations (continued)

Term	Explanation
URL	Uniform Resource Locator. the unique global address of resources or files on the World Wide Web. The URL contains the name of the protocol to be used to access the file resource, the IP address or the domain name of the computer where the resource is located, and a pathname -- a hierarchical description that specifies the location of a file in that computer.
VLAN	Virtual Local Area Network. A network of computers that behave as if they are connected to the same wire when they may be physically located on different segments of a LAN. VLANs are configured through software rather than hardware, which makes them extremely flexible. When a computer is physically moved to another location, it can stay on the same VLAN without any hardware reconfiguration. The standard is defined in IEEE 802.1Q - Virtual LANs, which states that 'IEEE 802 Local Area Networks (LANs) of all types may be connected together with Media Access Control (MAC) Bridges, as specified in ISO/IEC 15802-3. This standard defines the operation of Virtual LAN (VLAN) Bridges that permit the definition, operation and administration of Virtual LAN topologies within a Bridged LAN infrastructure.”
VNS	Virtual Network Services (VNS). A Siemens specific technique that provides a means of mapping wireless networks to a wired topology.
VoIP	Voice Over Internet Protocol. An internet telephony technique. With VoIP, a voice transmission is cut into multiple packets, takes the most efficient path along the Internet and is reassembled when it reaches the destination.
VPN	Virtual Private Network. A private network that is constructed by using public wires to connect nodes. These systems use encryption and other security mechanisms to ensure that only authorized users can access the network and that the data cannot be intercepted.
VSA	Vendor Specific Attribute, an attribute for a RADIUS server defined by the manufacturer.(compared to the RADIUS attributes defined in the original RADIUS protocol RFC2865). A VSA attribute is defined in order that it can be returned from the RADIUS server in the Access Granted packet to the Radius Client.
Walled Garden	A restricted subset of network content that wireless devices can access.
WEP	Wired Equivalent Privacy. A security protocol for wireless local area networks (WLANs) defined in the 802.11b standard. WEP aims to provide security by encrypting data over radio waves so that it is protected as it is transmitted from one end point to another.
Wi-Fi	Wireless fidelity. A term referring to any type of 802.11 network, whether 802.11b, 802.11a, dual-band, etc. Used in reference to the Wi-Fi Alliance, a nonprofit international association formed in 1999 to certify interoperability of wireless Local Area Network products based on IEEE 802.11 specification.
WINS	Windows Internet Naming Service. A system that determines the IP address associated with a particular network computer, called name resolution. WINS supports network client and server computers running Windows and can provide name resolution for other computers with special arrangements. WINS supports dynamic addressing (DHCP) by maintaining a distributed database that is automatically updated with the names of computers currently available and the IP address assigned to each one. DNS is an alternative system for name resolution suitable for network computers with fixed IP addresses.
WLAN	Wireless Local Area Network.

Table A-1 Networking Terms and Abbreviations (continued)

Term	Explanation
WMM	Wi-Fi Multimedia (WMM), a Wi-Fi Alliance certified standard that provides multimedia enhancements for Wi-Fi networks that improve the user experience for audio, video, and voice applications. This standard is compliant with the IEEE 802.11e Quality of Service (QoS) extensions for 802.11 networks. WMM provides prioritized media access by shortening the time between transmitting packets for higher priority traffic. WMM is based on the Enhanced Distributed Channel Access (EDCA) method.
WPA	Wireless Protected Access, or Wi-Fi Protected Access is a security solution adopted by the Wi-Fi Alliance that adds authentication to WEPs' basic encryption. For authentication, WPA specifies IEEE 802.1x authentication with Extensible Authentication Protocol (EAP). For encryption, WPA uses the Temporal Key Integrity Protocol (TKIP) mechanism, which shares a starting key between devices, and then changes their encryption key for every packet. Certificate Authentication (CA) can also be used. Also part of the encryption mechanism are 802.1x for dynamic key distribution and Message Integrity Check (MIC) a.k.a. Michael. WPA requires that all computers and devices have WPA software.
WPA-PSK	Wi-Fi Protected Access with Pre-Shared Key, a special mode of WPA for users without an enterprise authentication server. Instead, for authentication, a Pre-Shared Key is used. The PSK is a shared secret (passphrase) that must be entered in both the Wireless AP or router and the WPA clients. This preshared key should be a random sequence of characters at least 20 characters long or hexadecimal digits (numbers 0-9 and letters A-F) at least 24 hexadecimal digits long. After the initial shared secret, the Temporal Key Integrity Protocol (TKIP) handles the encryption and automatic rekeying.

Wireless Controller Terms and Abbreviations

Table A-2 Wireless Controller Terms and Abbreviations

Term	Explanation
DRM (dynamic radio/RF management)	Dynamic Radio Management (DRM) functionality of the SCALANCE IWLAN Controller is used to help establish the optimum radio configuration for your Wireless APs. DRM is enabled by default. The SCALANCE IWLAN Controller's DRM: • Adjusts power levels to balance coverage if another Wireless AP, which is assigned to the same SSID and is on the same channel, is added to or leaves the network. • Allows wireless clients to be moved to another Wireless AP if the load is too high. • Scans automatically for a channel, using a channel selection algorithm. • Avoids other WLANs by reducing transmit power whenever other Wireless APs with the same channel, but different SSIDs are detected. The DRM feature is comprised of two functions: • Auto Channel Selection (ACS) — ACS provides an easy way to optimize channel arrangement based on the current situation in the field. ACS provides an optimal solution only if it is triggered on all Wireless APs in a deployment. Triggering ACS on a single Wireless AP or on a subset of Wireless APs provides a useful but suboptimal solution. Also, ACS only relies on the information observed at the time it is triggered. Once a Wireless AP has selected a channel, it will remain operating on that channel until the user changes the channel or triggers ACS. • Auto Tx Power Control (ATPC) — ATPC guarantees your LAN a stable RF environment by automatically adapting transmission power signals according to the coverage provided by the Wireless APs. ATPC can be either enabled or disabled.
SCALANCE IWLAN Controller	The SCALANCE IWLAN Controller is a rack-mountable network device designed to be integrated into an existing wired Local Area Network (LAN). It provides centralized control over all access points (both Wireless APs and third-party access points) and manages the network assignment of wireless device clients associating through access points.
Langley	Langley is a SCALANCE WLC711 term for the inter-process messaging infrastructure on the SCALANCE IWLAN Controller.
Mitigator	The Mitigator is a mechanism that assists in the detection of rogue access points. The feature has three components: (1) a radio frequency (RF) scanning task that runs on the Wireless AP, (2) an application called the Data Collector on the SCALANCE IWLAN Controller that receives and manages the RF scan messages sent by the Wireless AP, (3) an Analysis Engine on the SCALANCE IWLAN Controller that processes the scan data.
Mobility manager (and mobility agent)	The technique by which multiple SCALANCE IWLAN Controllers on a network can discover each other and exchange information about a client session. This enables a wireless device user to roam seamlessly between different Wireless APs on different SCALANCE IWLAN Controllers, to provide mobility to the wireless device user. One SCALANCE IWLAN Controller on the network must be designated as the mobility manager. All other SCALANCE IWLAN Controllers are designated as mobility agents. Relying on SLP, the mobility manager registers with the Directory Agent and the mobility agents discover the location of the mobility manager.
Data Collector	The Data Collector is an application on the SCALANCE IWLAN Controller that receives and manages the Radio Frequency (RF) scan messages sent by the Wireless AP. This application is part of the Mitigator technique, working in conjunction with the scanner mechanism and the Analysis Engine to assist in detecting rogue access points.

Table A-2 Wireless Controller Terms and Abbreviations (continued)

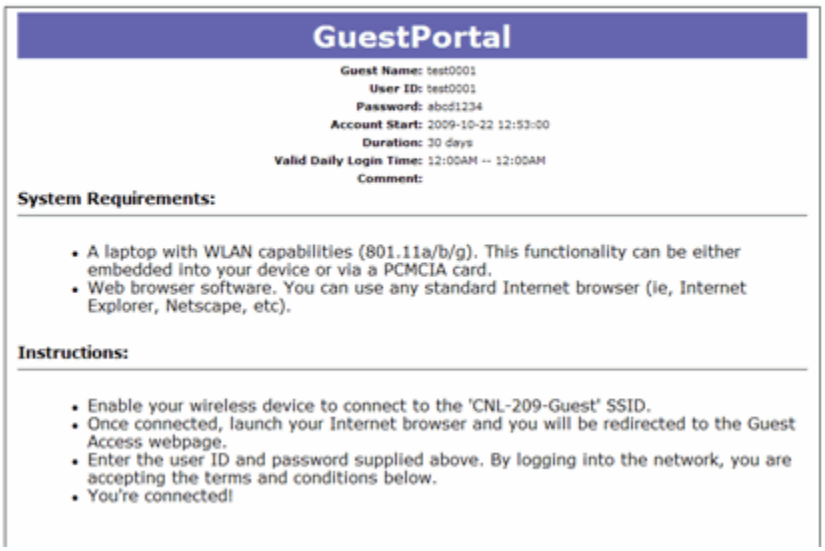
Term	Explanation
Virtual Network Services (VNS)	The Virtual Network Services (VNS) technique is Siemenss means of mapping wireless networks to the topology of an existing wired network. When you set up Virtual Network Services (VNS) on the SCALANCE IWLAN Controller, you are defining subnets for groups of wireless users. This VNS definition creates a virtual IP subnet where the SCALANCE IWLAN Controller acts as a default gateway for wireless devices. This technique enables policies and authentication to be applied to the groups of wireless users on a VNS, as well as the collecting of accounting information. When a VNS is set up on the SCALANCE IWLAN Controller, one or more Wireless APs (by radio) are associated with it. A range of IP addresses is set aside for the SCALANCE IWLAN Controller's DHCP server to assign to wireless devices.
Wireless AP	The Wireless AP is a wireless LAN thin access point (IEEE 802.11) provided with unique software that allows it to communicate only with a SCALANCE IWLAN Controller. (A thin access point handles the radio frequency (RF) communication but relies on a controller to handle WLAN elements such as authentication.) The Wireless AP also provides local processing such as encryption. The Wireless AP is a dual-band access point, with 802.11a/b/g/n radios.

B

Default GuestPortal Source Code

For information about...	Refer to page...
Ticket Page	B-1
GuestPortal Sample Header Page	B-4
GuestPortal Sample Footer Page	B-6

Ticket Page


GuestPortal
Guest Name: test0001
User ID: test0001
Password: abcd1234
Account Start: 2009-10-22 12:53:00
Duration: 30 days
Valid Daily Login Time: 12:00AM -- 12:00AM
Comment:
System Requirements:
A laptop with WLAN capabilities (801.11a/b/g). This functionality can be either embedded into your device or via a PCMCIA card.
Web browser software. You can use any standard Internet browser (ie, Internet Explorer, Netscape, etc).
Instructions:
Enable your wireless device to connect to the 'CNL-209-Guest' SSID.
Once connected, launch your Internet browser and you will be redirected to the Guest Access webpage.
Enter the user ID and password supplied above. By logging into the network, you are accepting the terms and conditions below.
You're connected!

Placeholders Used in the Default GuestPortal Ticket Page

Table B-1 Default GuestPortal Ticket Page Template Placeholders

Placeholder tag	Description
!GuestName	Guest Name
!GuestComment	Guest Comment
!TimeOfDayStart	Time-of-day start
!TimeOfDayDuration	Time-of-day session duration
!SessionLifeTime	Maximum session time

Table B-1 Default GuestPortal Ticket Page Template Placeholders (continued)

Placeholder tag	Description
!UserID	User ID for the guest
!Password	Password for the guest
!SSID	SSID to connect to
!AccountActivationTime	Account available time
!AccountLifeTime	Account life time

Default GuestPortal Ticket Page Source Code

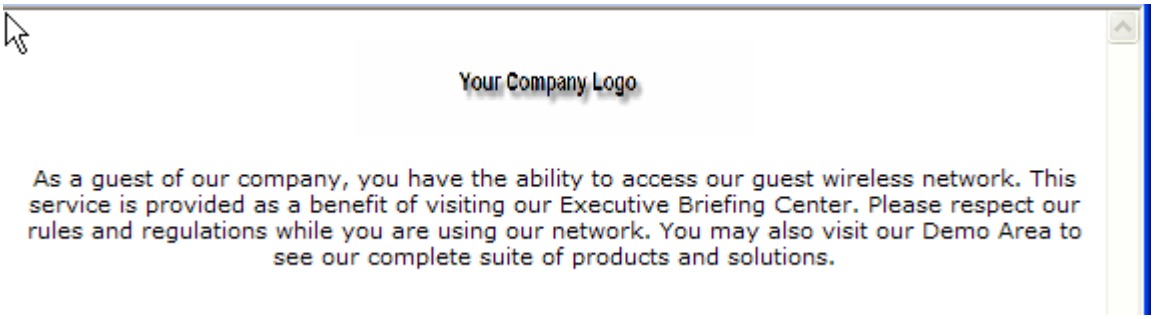
Note:
The GuestPortal account information placeholders used in the html code are preceded by the ! character.

```
<HTML>
<HEAD>
        <title></title>
        <meta content="text/html;charset=utf-8" http-equiv="Content-Type"/>
</HEAD>
<body style="text-align:center">
        <table cellspacing="0" cellpadding="0" border="0" align="center"
width="790">
        <tr>
                <td style="background-color:#6666b0;color:white;font-
weight:bold;font-size:30;padding:5px"


align="center" width="790">GuestPortal</td>
        </tr>
        </table>

        <table cellspacing="5" cellpadding="0" border="0" style="margin:0 auto">
        <tr>
                <td align="right"><b>Guest Name:</b></td>
                <td align="left">!GuestName</td>
        </tr>
        <tr>
                <td align="right"><b>User ID:</b></td>
                <td align="left">!UserID</td>
        </tr>
        <tr>
                <td align="right"><b>Password:</b></td>
                <td align="left">!Password</td>
        </tr>
```

```
        <tr>
                <td align="right"><b>Account Start:</b></td>
                <td align="left">!AccountActivationTime</td>
        </tr>
        <tr>
                <td align="right"><b>Duration:</b></td>
                <td align="left">!AccountLifeTime</td>
        </tr>
        <tr>
                <td align="right"><b>Valid Daily Login Time:</b></td>
                <td align="left">!TimeOfDayStart -- !TimeOfDayDuration</td>
        </tr>
        <tr>
                <td align="right"><b>Comment:</b></td>
                <td align="left">!GuestComment</td>
        </tr>
        </table>

         <div style="width:790px;margin:0 auto;text-align:left">
                <b>System Requirements:</b>
                <hr width=790 size=2 noshade>
                <div style="padding-left:30px">
                        <ul>
                                <li>A laptop with WLAN capabilities (801.11a/b/
g). This functionality can be either embedded into your device or via a PCMCIA
card.
                            <li>Web browser software. You can use any standard
Internet browser (ie, Internet Explorer, Netscape, etc).
                        </ul>
                </div>
        </div>

        <div style="width:790px;margin:10px auto;text-align:left">
                <b>Instructions:</b>
                <hr width=790 size=2 noshade>
                <div style="padding-left:30px;">
                        <ul>
                               <li>Enable your wireless device to connect to the
'!SSID' SSID.
                             <li>Once connected, launch your Internet browser
and you will be redirected to the Guest Access webpage.
                            <li>Enter the user ID and password supplied above.
By logging into the network, you are accepting the terms and conditions below.
                                <li>You're connected!
                        </ul>
```

```
                    </div>
                </div>

</div>
</body>
</HTML>
```

GuestPortal Sample Header Page

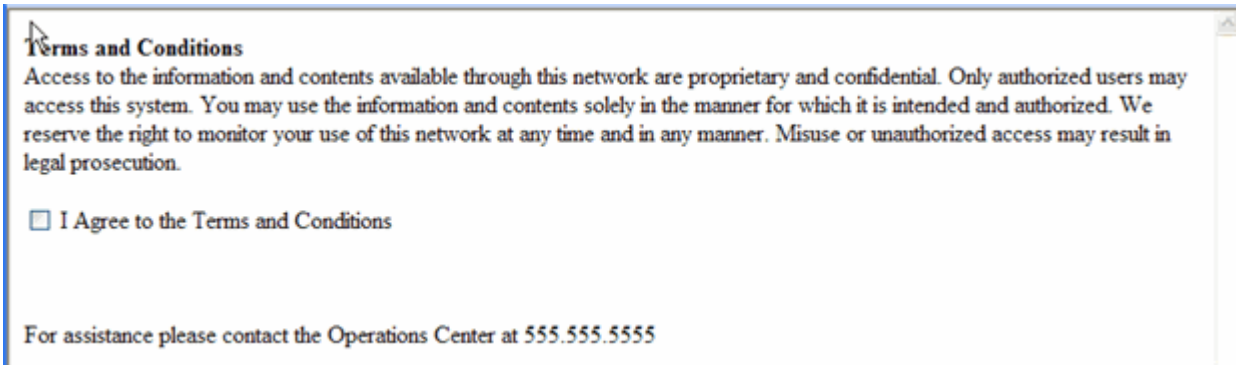

Your Company Logo
As a guest of our company, you have the ability to access our guest wireless network. This service is provided as a benefit of visiting our Executive Briefing Center. Please respect our rules and regulations while you are using our network. You may also visit our Demo Area to see our complete suite of products and solutions.

Sample Header Page Source Code

```
<HTML><HEAD><TITLE>your company name</TITLE>
<META http-equiv=Content-Type content="text/html; charset=windows-1252">

<STYLE type=text/css>BODY {
FONT-SIZE: 11px; COLOR: #000000; FONT-FAMILY: Verdana, Arial, Helvetica, sans-serif
}
TD {
FONT-SIZE: 11px; COLOR: #000000; FONT-FAMILY: Verdana, Arial, Helvetica, sans-serif
}
H3 {
FONT-SIZE: 14px; COLOR: #000066; FONT-FAMILY: Verdana, Arial, Helvetica, sans-serif
}
</STYLE>
<META content="Microsoft FrontPage 5.0" name=GENERATOR></HEAD>
<BODY>
<SPAN id=0 style="DISPLAY: none;">
<CENTER>
  <span id="1" style="DISPLAY: true;"><span id="1">
  <img border="0" src="your_logo.gif" width="198" height="49"></span></span>
</CENTER>
<H3>Wireless Guest Access Login</H3>
<BR>
```

```
  Please enter the <strong>Username and Password</strong> you were assigned from
the Receptionist. <br>
  <INPUT type=hidden value=wba_login
name=fname>
  <TABLE cellPadding=3 border=0>
    <TBODY>
      <TR>
        <TD align=right>Username:</TD>
        <TD><INPUT maxLength=32 size=15 name=username></TD>
      </TR>
      <TR>
        <TD align=right>Password:</TD>
        <TD><INPUT type=password maxLength=32 size=15 name=key></TD>
      </TR>
      <TR>
        <TD align=right colSpan=2>
        </TD>
      </TR>
    </TBODY>
  </TABLE>
  <br>
  For assistance please contact our Operations Center at 555.555.5555
<BR>
</SPAN> <SPAN id=1 style="DISPLAY: true;">
  <p align="center"><span id="1">
  <img border="0" src="your_logo.gif" width="198" height="49"></span><br>
  <br>
  As a guest of our company, you have the ability to access our guest wireless
network.
  This service is provided as a benefit of visiting our Executive Briefing Center.
  Please respect our rules and regulations while you are using our network. You
may also visit our Demo Area to see our complete suite of products and solutions.
  </p>
```

GuestPortal Sample Footer Page


Terms and Conditions
Access to the information and contents available through this network are proprietary and confidential. Only authorized users may access this system. You may use the information and contents solely in the manner for which it is intended and authorized. We reserve the right to monitor your use of this network at any time and in any manner. Misuse or unauthorized access may result in legal prosecution.
I Agree to the Terms and Conditions
For assistance please contact the Operations Center at 555.555.5555

Sample Footer Page Source Code

```
<html>
<body>
    <strong>Terms and Conditions</strong><br>
    Access to the information and contents available through this network are proprietary and confidential. Only authorized users may access this system.
   You may use the information and contents solely in the manner for which it is intended and authorized. We reserve the right to monitor your use of this network at any time and in any manner. Misuse or unauthorized access may result in legal prosecution.
    <BR>
    <BR>
    <input type="checkbox" name="agree" value="on">
    I Agree to the Terms and Conditions <SPAN id=2 style="DISPLAY: none; FONT-WEIGHT: bold; FONT-SIZE: x-small; COLOR: red">Required</SPAN>
    <br>
    <br>
    <br>
<br>
    For assistance please contact the Operations Center at 555.555.5555
 </p>
</SPAN>

</BODY></HTML>
```